OM-350 000 739AB
December 2001

Processes

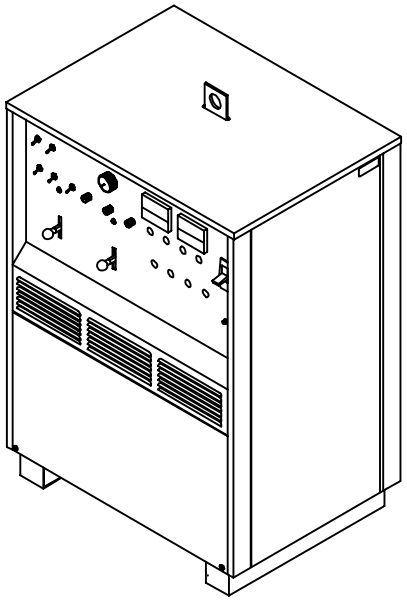
TIG (GTAW) Welding

Stick (SMAW) Welding

Description

Arc Welding Power Source

Syncrowave® 500

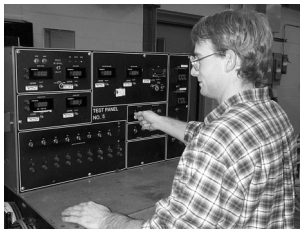


OWNER'S MANUAL

Visit our website at
www.MillerWelds.com

From Miller to You

Thank you and *congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.



That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

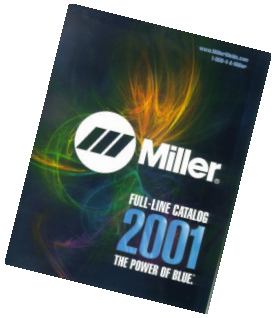
This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite.

ISO 9001 REGISTERED QUALITY SYSTEM

Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001 Quality System Standard.

We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide which exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.

Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual catalog sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at www.MillerWelds.com on the web.**



TRUE BLUE® WARRANTY

Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.

Miller offers a Technical Manual which provides more detailed service and parts information for your unit. To obtain a Technical Manual, contact your local distributor. Your distributor can also supply you with Welding Process Manuals such as SMAW, GTAW, GMAW, and GMAW-P.

Miller
The Power of Blue.

WARNING

This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)

TABLE OF CONTENTS

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING 1
1-1. Symbol Usage 1
1-2. Arc Welding Hazards 1
1-3. Additional Symbols for Installation, Operation, and Maintenance 3
1-4. Principal Safety Standards 3
1-5. EMF Information 4

SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION 5
1-1. Signification des symboles 5
1-2. Dangers relatifs au soudage à l'arc 5
1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance 7
1-4. Principales normes de sécurité 8
1-5. Information sur les champs électromagnétiques 8

SECTION 2 – INSTALLATION 9
2-1. Specifications 9
2-2. Duty Cycle 9
2-3. Volt-Ampere Curves 9
2-4. Typical Process Connections 10
2-5. Selecting A Location And Moving Welding Power Source 10
2-6. Overall Dimensions And Base Mounting Hole Layout 11
2-7. Selecting And Preparing Weld Output Cables 11
2-8. Weld Cable Size* 11
2-9. Lower Front Panel 12
2-10. Installing Gas Supply 12
2-11. 115 Volts AC Duplex Receptacle And Circuit Breaker 13
2-12. Connecting To Weld Output Terminals 13
2-13. Remote 14 Receptacle Information And Connections 14
2-14. Remote 14 Socket Information 14
2-15. Positioning Jumper Links 15
2-16. Electrical Service Guide 15
2-17. Connecting Input Power 16

SECTION 3 – OPERATION 17
3-1. Controls 17
3-2. Work Clamp 18
3-3. AC/DC And Polarity Switches 18
3-4. Amperage/Voltage Controls 19
3-5. Start Amperage Controls 19
3-6. Output (Contactor) Switch 20
3-7. AC Balance Control 20
3-8. Postflow Time Control 21
3-9. High Frequency Controls 21
3-10. Crater Fill Switch 21
3-11. Ammeter And Voltmeter 22
3-12. Power Switch 22
3-13. Shielding Gas 23
3-14. Sequence Of Gas Tungsten Arc Welding (GTAW) 23
3-15. Sequence Of Shielded Metal Arc Welding (SMAW) 23

SECTION 4 – MAINTENANCE & TROUBLESHOOTING 24
4-1. Routine Maintenance 24
4-2. Adjusting Spark Gaps 24
4-3. Troubleshooting 25

SECTION 5 – ELECTRICAL DIAGRAM 26

SECTION 6 – HIGH FREQUENCY 28
6-1. Welding Processes Requiring High Frequency 28
6-2. Incorrect Installation 28
6-3. Correct Installation 29

SECTION 7 – SELECTING AND PREPARING TUNGSTEN ELECTRODE FOR DC . . . . . OR AC WELDING 30
7-1. Selecting Tungsten Electrode (Wear Clean gloves To Prevent Contamination Of Tungsten) 30
7-2. Preparing Tungsten Electrode For Welding 31

SECTION 8 – GUIDELINES FOR TIG WELDING (GTAW) 32
8-1. Positioning The Torch 32
8-2. Torch Movement During Welding 33
8-3. Positioning Torch Tungsten For Various Weld Joints 34

SECTION 9 – PARTS LIST 36

OPTIONS AND ACCESSORIES

WARRANTY

SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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1-1. Symbol Usage

Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ *Means "Note"; not safety related.*

This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-4. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**

ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.
- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

SIGNIFICANT DC VOLTAGE exists after removal of input power on inverters.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.

FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use exhaust at the arc to remove welding fumes and gases.
- If ventilation is poor, use an approved air-supplied respirator.
- Read the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and if necessary, while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.

ARC RAYS can burn eyes and skin.

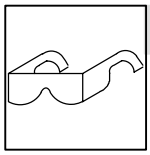
Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

- Wear a welding helmet fitted with a proper shade of filter to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash and glare; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather and wool) and foot protection.

WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Protect yourself and others from flying sparks and hot metal.
- Do not weld where flying sparks can strike flammable material.
- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.



FLYING METAL can injure eyes.

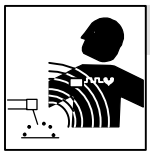
- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.

BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.

HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.



MAGNETIC FIELDS can affect pacemakers.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.

CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Read and follow instructions on compressed gas cylinders, associated equipment, and CGA publication P-1 listed in Safety Standards.

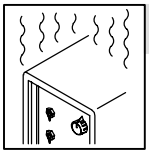
1-3. Additional Symbols For Installation, Operation, And Maintenance

FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.

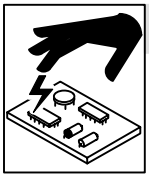
FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.

MOVING PARTS can cause injury.

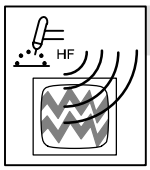
- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.

WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.



H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.

ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

1-4. Principal Safety Standards

Safety in Welding and Cutting, ANSI Standard Z49.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami FL 33126

Safety and Health Standards, OSHA 29 CFR 1910, from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practices for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, American Welding Society Standard AWS F4.1, from American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126

National Electrical Code, NFPA Standard 70, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, from Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Code for Safety in Welding and Cutting, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, ANSI Standard Z87.1, from American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting And Welding Processes, NFPA Standard 51B, from National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: “The body of evidence, in the committee’s judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard.” However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

About Pacemakers:

Pacemaker wearers consult your doctor first. If cleared by your doctor, then following the above procedures is recommended.

SECTION 1 – CONSIGNES DE SECURITE – LIRE AVANT UTILISATION

1-1. Signification des symboles

Signifie Mise en garde ! Soyez vigilant ! Cette procédure présente des risques de danger ! Ceux-ci sont identifiés par des symboles adjacents aux directives.

▲ **Identifie un message de sécurité particulier.**

☞ *Signifie NOTA ; n'est pas relatif à la sécurité.*

Ce groupe de symboles signifie Mise en garde ! Soyez vigilant ! Il y a des risques de danger reliés aux CHOCS ÉLECTRIQUES, aux PIÈCES EN MOUVEMENT et aux PIÈCES CHAUDES. Reportez-vous aux symboles et aux directives ci-dessous afin de connaître les mesures à prendre pour éviter tout danger.

1-2. Dangers relatifs au soudage à l'arc

▲ **Les symboles présentés ci-après sont utilisés tout au long du présent manuel pour attirer votre attention et identifier les risques de danger. Lorsque vous voyez un symbole, soyez vigilant et suivez les directives mentionnées afin d'éviter tout danger. Les consignes de sécurité présentées ci-après ne font que résumer l'information contenue dans les normes de sécurité énumérées à la section 1-4. Veuillez lire et respecter toutes ces normes de sécurité.**

▲ **L'installation, l'utilisation, l'entretien et les réparations ne doivent être confiés qu'à des personnes qualifiées.**

▲ **Au cours de l'utilisation, tenir toute personne à l'écart et plus particulièrement les enfants.**

UN CHOC ÉLECTRIQUE peut tuer.

Un simple contact avec des pièces électriques peut provoquer une électrocution ou des blessures graves. L'électrode et le circuit de soudage sont sous tension dès que l'appareil est sur ON. Le circuit d'entrée et les circuits internes de l'appareil sont également sous tension à ce moment-là. En soudage semi-automatique ou automatique, le fil, le dévidoir, le logement des galets d'entraînement et les pièces métalliques en contact avec le fil de soudage sont sous tension. Des matériels mal installés ou mal mis à la terre présentent un danger.

- Ne jamais toucher les pièces électriques sous tension.
- Porter des gants et des vêtements de protection secs ne comportant pas de trous.
- S'isoler de la pièce et de la terre au moyen de tapis ou d'autres moyens isolants suffisamment grands pour empêcher le contact physique éventuel avec la pièce ou la terre.
- Ne pas se servir de source électrique àcourant électrique dans les zones humides, dans les endroits confinés ou là où on risque de tomber.
- Se servir d'une source électrique àcourant électrique UNIQUEMENT si le procédé de soudage le demande.
- Si l'utilisation d'une source électrique àcourant électrique s'avère nécessaire, se servir de la fonction de télécommande si l'appareil en est équipé.
- Couper l'alimentation ou arrêter le moteur avant de procéder à l'installation, à la réparation ou à l'entretien de l'appareil. Déverrouiller l'alimentation selon la norme OSHA 29 CFR 1910.147 (voir normes de sécurité).
- Installer et mettre à la terre correctement cet appareil conformément à son manuel d'utilisation et aux codes nationaux, provinciaux et municipaux.
- Toujours vérifier la terre du cordon d'alimentation – Vérifier et s'assurer que le fil de terre du cordon d'alimentation est bien raccordé à la borne de terre du sectionneur ou que la fiche du cordon est raccordée à une prise correctement mise à la terre.
- En effectuant les raccordements d'entrée fixer d'abord le conducteur de mise à la terre approprié et contre-vérifier les connexions.
- Vérifier fréquemment le cordon d'alimentation pour voir s'il n'est pas endommagé ou dénudé – remplacer le cordon immédiatement s'il est endommagé – un câble dénudé peut provoquer une électrocution.
- Mettre l'appareil hors tension quand on ne l'utilise pas.
- Ne pas utiliser des câbles usés, endommagés, de grosseur insuffisante ou mal épissés.
- Ne pas enrouler les câbles autour du corps.
- Si la pièce soudée doit être mise à la terre, le faire directement avec un câble distinct.
- Ne pas toucher l'électrode quand on est en contact avec la pièce, la terre ou une électrode provenant d'une autre machine.
- N'utiliser qu'un matériel en bon état. Réparer ou remplacer sur-le-champ les pièces endommagées. Entretenir l'appareil conformément à ce manuel.
- Porter un harnais de sécurité quand on travaille en hauteur.
- Maintenir solidement en place tous les panneaux et capots.
- Fixer le câble de retour de façon à obtenir un bon contact métal-métal avec la pièce à souder ou la table de travail, le plus près possible de la soudure.
- Isoler la pince de masse quand pas mis à la pièce pour éviter le contact avec tout objet métallique.

Il y a DU COURANT CONTINU IMPORTANT dans les convertisseurs après la suppression de l'alimentation électrique.

- Arrêter les convertisseurs, débrancher le courant électrique, et décharger les condensateurs d'alimentation selon les instructions indiquées dans la partie entretien avant de toucher les pièces.

LES FUMÉES ET LES GAZ peuvent être dangereux.

Le soudage génère des fumées et des gaz. Leur inhalation peut être dangereux pour votre santé.

- Eloigner votre tête des fumées. Ne pas respirer les fumées.
- A l'intérieur, ventiler la zone et/ou utiliser un échappement au niveau de l'arc pour l'évacuation des fumées et des gaz de soudage.
- Si la ventilation est insuffisante, utiliser un respirateur à alimentation d'air homologué.
- Lire les spécifications de sécurité des matériaux (MSDSs) et les instructions du fabricant concernant les métaux, les consommables, les revêtements, les nettoyants et les dégraisseurs.
- Travailler dans un espace fermé seulement s'il est bien ventilé ou en portant un respirateur à alimentation d'air. Demander toujours à un surveillant dûment formé de se tenir à proximité. Des fumées et des gaz de soudage peuvent déplacer l'air et abaisser le niveau d'oxygène provoquant des blessures ou des accidents mortels. S'assurer que l'air de respiration ne présente aucun danger.
- Ne pas souder dans des endroits situés à proximité d'opérations de dégraissage, de nettoyage ou de pulvérisation. La chaleur et les rayons de l'arc peuvent réagir en présence de vapeurs et former des gaz hautement toxiques et irritants.
- Ne pas souder des métaux munis d'un revêtement, tels que l'acier galvanisé, plaqué en plomb ou au cadmium à moins que le revêtement n'ait été enlevé dans la zone de soudure, que l'endroit soit bien ventilé, et si nécessaire, en portant un respirateur à alimentation d'air. Les revêtements et tous les métaux renfermant ces éléments peuvent dégager des fumées toxiques en cas de soudage.

LES RAYONS DE L'ARC peuvent provoquer des brûlures dans les yeux et sur la peau.

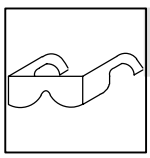
Le rayonnement de l'arc du procédé de soudage génère des rayons visibles et invisibles intenses (ultraviolets et infrarouges) susceptibles de provoquer des brûlures dans les yeux et sur la peau. Des étincelles sont projetées pendant le soudage.

- Porter un casque de soudage muni d'un écran de filtre approprié pour protéger votre visage et vos yeux pendant le soudage ou pour regarder (voir ANSI Z49.1 et Z87.1 énuméré dans les normes de sécurité).
- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.
- Utiliser des écrans ou des barrières pour protéger des tiers de l'éclair et de l'éblouissement; demander aux autres personnes de ne pas regarder l'arc.
- Porter des vêtements de protection constitué dans une matière durable, résistant au feu (cuir ou laine) et une protection des pieds.

LE SOUDAGE peut provoquer un incendie ou une explosion.

Le soudage effectué sur des conteneurs fermés tels que des réservoirs, tambours ou des conduites peut provoquer leur éclatement. Des étincelles peuvent être projetées de l'arc de soudure. La projection d'étincelles, des pièces chaudes et des équipements chauds peut provoquer des incendies et des brûlures. Le contact accidentel de l'électrode avec des objets métalliques peut provoquer des étincelles, une explosion, un surchauffement ou un incendie. Avant de commencer le soudage, vérifier et s'assurer que l'endroit ne présente pas de danger.

- Se protéger et d'autres personnes de la projection d'étincelles et de métal chaud.
- Ne pas souder dans un endroit là où des étincelles peuvent tomber sur des substances inflammables.
- Déplacer toutes les substances inflammables à une distance de 10,7 m de l'arc de soudage. En cas d'impossibilité les recouvrir soigneusement avec des protections homologués.
- Des étincelles et des matériaux chauds du soudage peuvent facilement passer dans d'autres zones en traversant de petites fissures et des ouvertures.
- Surveiller tout déclenchement d'incendie et tenir un extincteur à proximité.
- Le soudage effectué sur un plafond, plancher, paroi ou séparation peut déclencher un incendie de l'autre côté.
- Ne pas effectuer le soudage sur des conteneurs fermés tels que des réservoirs, tambours, ou conduites, à moins qu'ils n'aient été préparés correctement conformément à AWS F4.1 (voir les normes de sécurité).
- Brancher le câble sur la pièce le plus près possible de la zone de soudage pour éviter le transport du courant sur une longue distance par des chemins inconnus éventuels en provoquant des risques d'électrocution et d'incendie.
- Ne pas utiliser le poste de soudage pour dégeler des conduites gelées.
- En cas de non utilisation, enlever la baguette d'électrode du porte-électrode ou couper le fil à la pointe de contact.
- Porter des vêtements de protection dépourvus d'huile tels que des gants en cuir, une chemise en matériau lourd, des pantalons sans revers, des chaussures hautes et un couvre chef.
- Avant de souder, retirer toute substance combustible de vos poches telles qu'un allumeur au butane ou des allumettes.



DES PARTICULES VOLANTES peuvent blesser les yeux.

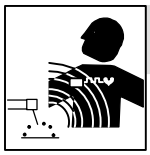
- Le soudage, l'écaillement, le passage de la pièce à la brosse en fil de fer, et le meulage génèrent des étincelles et des particules métalliques volantes. Pendant la période de refroidissement des soudures, elles risquent de projeter du laitier.
- Porter des lunettes de sécurité avec écrans latéraux ou un écran facial.

LES ACCUMULATIONS DE GAZ risquent de provoquer des blessures ou même la mort.

- Fermer l'alimentation du gaz protecteur en cas de non utilisation.
- Veiller toujours à bien aérer les espaces confinés ou se servir d'un respirateur d'adduction d'air homologué.

DES PIÈCES CHAUDES peuvent provoquer des brûlures graves.

- Ne pas toucher des parties chaudes à mains nues
- Prévoir une période de refroidissement avant d'utiliser le pistolet ou la torche.



LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

LE BRUIT peut affecter l'ouïe.

Le bruit des processus et des équipements peut affecter l'ouïe.

- Porter des protections approuvés pour les oreilles si le niveau sondre est trop élevé.

Si des BOUTEILLES sont endommagées, elles pourront exploser.

Des bouteilles de gaz protecteur contiennent du gaz sous haute pression. Si une bouteille est endommagée, elle peut exploser. Du fait que les bouteilles de gaz font normalement partie du procédé de soudage, les manipuler avec précaution.

- Protéger les bouteilles de gaz comprimé d'une chaleur excessive, des chocs mécaniques, du laitier, des flammes ouvertes, des étincelles et des arcs.
- Placer les bouteilles debout en les fixant dans un support stationnaire ou dans un porte-bouteilles pour les empêcher de tomber ou de se renverser.
- Tenir les bouteilles éloignées des circuits de soudage ou autres circuits électriques.
- Ne jamais placer une torche de soudage sur une bouteille à gaz.
- Une électrode de soudage ne doit jamais entrer en contact avec une bouteille.
- Ne jamais souder une bouteille pressurisée – risque d'explosion.
- Utiliser seulement des bouteilles de gaz protecteur, régulateurs, tuyaux et raccords convenables pour cette application spécifique; les maintenir ainsi que les éléments associés en bon état.
- Ne pas tenir la tête en face de la sortie en ouvrant la soupape de la bouteille.
- Maintenir le chapeau de protection sur la soupape, sauf en cas d'utilisation ou de branchement de la bouteille.
- Lire et suivre les instructions concernant les bouteilles de gaz comprimé, les équipements associés et les publications P-1 CGA énumérées dans les normes de sécurité.

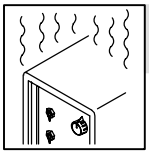
1-3. Dangers supplémentaires en relation avec l'installation, le fonctionnement et la maintenance

Risque D'INCENDIE OU D'EXPLOSION.

- Ne pas placer l'appareil sur, au-dessus ou à proximité de surfaces infllammables.
- Ne pas installer l'appareil à proximité de produits inflammables
- Ne pas surcharger l'installation électrique – s"assurer que l'alimentation est correctement dimensionné et protégé avant de mettre l'appareil en service.

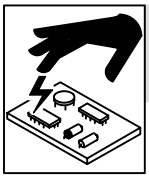
LA CHUTE DE L'APPAREIL peut blesser.

- Utiliser l'anneau de levage uniquement pour soulever l'appareil, NON PAS les chariot, les bouteilles de gaz ou tout autre accessoire.
- Utiliser un engin d'une capacité appropriée pour soulever l'appareil.
- En utilisant des fourches de levage pour déplacer l'unité, s'assurer que les fourches sont suffisamment longues pour dépasser du côté opposé de l'appareil.



L'EMPLOI EXCESSIF peut SURCHAUFFER L'ÉQUIPEMENT.

- Prévoir une période de refroidissement, respecter le cycle opératoire nominal.
- Réduire le courant ou le cycle opératoire avant de recommancer le soudage.
- Ne pas obstruer les passages d'air du poste.



LES CHARGES ÉLECTROSTATIQUES peuvent endommager les circuits imprimés.

- Établir la connexion avec la barrette de terre avant de manipuler des cartes ou des pièces.
- Utiliser des pochettes et des boîtes antistatiques pour stocker, déplacer ou expédier des cartes de circuits imprimes.

DES ORGANES MOBILES peuvent provoquer des blessures.

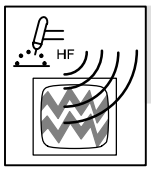
- Ne pas s'approcher des organes mobiles.
- Ne pas s'approcher des points de coincement tels que des rouleaux de commande.

LES FILS DE SOUDAGE peuvent provoquer des blessures.

- Ne pas appuyer sur la gachette avant d'en avoir reçu l'instruction.
- Ne pas diriger le pistolet vers soi, d'autres personnes ou toute pièce mécanique en engageant le fil de soudage.

DES ORGANES MOBILES peuvent provoquer des blessures.

- Rester à l'écart des organes mobiles comme le ventilateur.
- Maintenir fermés et fixement en place les portes, panneaux, recouvrements et dispositifs de protection.



LE RAYONNEMENT HAUTE FRÉQUENCE (H.F.) risque de provoquer des interférences.

- Le rayonnement haute frequence peut provoquer des interférences avec les équipements de radio–navigation et de communication, les services de sécurité et les ordinateurs.
- Demander seulement à des personnes qualifiées familiarisées avec des équipements électroniques de faire fonctionner l'installation.
- L'utilisateur est tenu de faire corriger rapidement par un électricien qualifié les interférences résultant de l'installation.
- Si le FCC signale des interférences, arrêter immédiatement l'appareil.
- Effectuer régulièrement le contrôle et l'entretien de l'installation.
- Maintenir soigneusement fermés les portes et les panneaux des sources de haute fréquence, maintenir les éclateurs à une distance correcte et utiliser une terre et et un blindage pour réduire les interférences éventuelles.

LE SOUDAGE À L'ARC risque de provoquer des interférences.

- L'énergie électromagnétique risque de provoquer des interférences pour l'équipement électronique sensible tel que les ordinateurs et l'équipement commandé par ordinateur tel que les robots.
- Veiller à ce que tout l'équipement de la zone de soudage soit compatible électromagnétiquement.
- Pour réduire la possibilité d'interférence, maintenir les câbles de soudage aussi courts que possible, les grouper, et les poser aussi bas que possible (ex. par terre).
- Veiller à souder à une distance de 100 mètres de tout équipement électronique sensible.
- Veiller à ce que ce poste de soudage soit posé et mis à la terre conformément à ce mode d'emploi.
- En cas d'interférences après avoir pris les mesures précédentes, il incombe à l'utilisateur de prendre des mesures supplémentaires telles que le déplacement du poste, l'utilisation de câbles blindés, l'utilisation de filtres de ligne ou la pose de protecteurs dans la zone de travail.

LES CHAMPS MAGNÉTIQUES peuvent affecter les stimulateurs cardiaques.

- Porteurs de stimulateur cardiaque, restez à distance.
- Les porteurs d'un stimulateur cardiaque doivent d'abord consulter leur médecin avant de s'approcher des opérations de soudage à l'arc, de gougeage ou de soudage par points.

1-4. Principales normes de sécurité

Safety in Welding and Cutting, norme ANSI Z49.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

Safety and Health Sandards, OSHA 29 CFR 1910, du Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Recommended Safe Practice for the Preparation for Welding and Cutting of Containers That Have Held Hazardous Substances, norme AWS F4.1, de l'American Welding Society, 550 N.W. Lejeune Rd, Miami FL 33126

National Electrical Code, NFPA Standard 70, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

Safe Handling of Compressed Gases in Cylinders, CGA Pamphlet P-1, de la Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.

Règles de sécurité en soudage, coupage et procédés connexes, norme CSA W117.2, de l'Association canadienne de normalisation, vente de normes, 178 Rexdale Boulevard, Rexdale (Ontario) Canada M9W 1R3.

Safe Practices For Occupation And Educational Eye And Face Protection, norme ANSI Z87.1, de l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

Cutting and Welding Processes, norme NFPA 51B, de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

1-5. Information sur les champs électromagnétiques

Données sur le soudage électrique et sur les effets, pour l'organisme, des champs magnétiques basse fréquence

Le courant de soudage, pendant son passage dans les câbles de soudage, causera des champs électromagnétiques. Il y a eu et il y a encore un certain souci à propos de tels champs. Cependant, après avoir examiné plus de 500 études qui ont été faites pendant une période de recherche de 17 ans, un comité spécial ruban bleu du National Research Council a conclu: "L'accumulation de preuves, suivant le jugement du comité, n'a pas démontré que l'exposition aux champs magnétiques et champs électriques à haute fréquence représente un risque à la santé humaine". Toutefois, des études sont toujours en cours et les preuves continuent à être examinées. En attendant que les conclusions finales de la recherche soient établies, il vous serait souhaitable de réduire votre exposition aux champs électromagnétiques pendant le soudage ou le coupage.

Afin de réduire les champs électromagnétiques dans l'environnement de travail, respecter les consignes suivantes :

1 Garder les câbles ensembles en les torsadant ou en les attachant avec du ruban adhésif.

2 Mettre tous les câbles du côté opposé de l'opérateur.

3 Ne pas courber pas et ne pas entourer pas les câbles autour de votre corps.

4 Garder le poste de soudage et les câbles le plus loin possible de vous.

5 Relier la pince de masse le plus près possible de la zone de soudure.

Consignes relatives aux stimulateurs cardiaques :

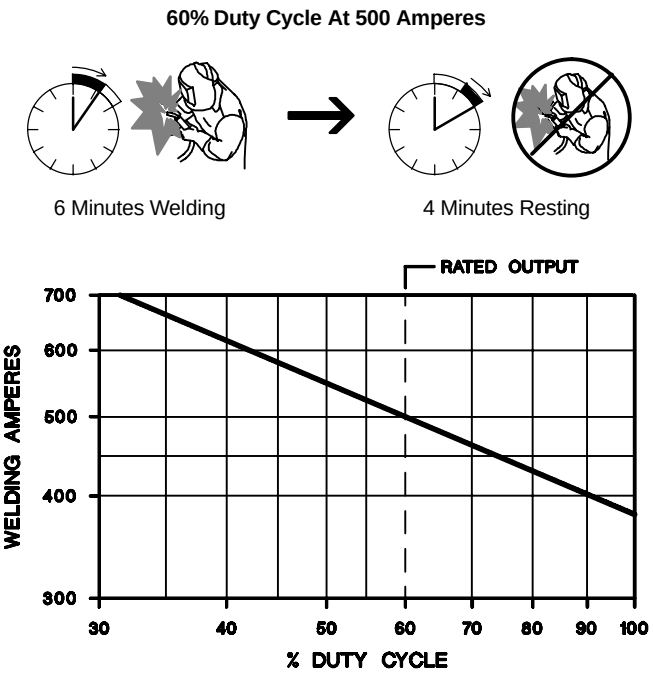
Les personnes qui portent un stimulateur cardiaque doivent avant tout consulter leur docteur. Si vous êtes déclaré apte par votre docteur, il est alors recommandé de respecter les consignes ci–dessus.

SECTION 2 – INSTALLATION

2-1. Specifications

Rated Welding Output	Amperage Range	Maximum Open-Circuit Voltage DC	Amperes Input at Rated Load Output, 60 Hz, Single-Phase					
			200 V	230 V	460 V	575 V	KVA	KW
NEMA Class I (60) – 500 Amperes, 40 Volts AC At 60% Duty Cycle	25–625	80	206 (42*)	180 (36.5*)	90 (18.3*)	72 (14.6*)	41.4 (8.4*)	26 (1.3*)
* While idling								

2-2. Duty Cycle



Duty Cycle is percentage of 10 minutes that unit can weld at rated load without overheating.

If unit overheats, thermostat(s) opens, output stops, and cooling fan runs. Wait fifteen minutes for unit to cool. Reduce amperage or voltage, or duty cycle before welding.

▲ **Exceeding duty cycle can damage unit and void warranty.**

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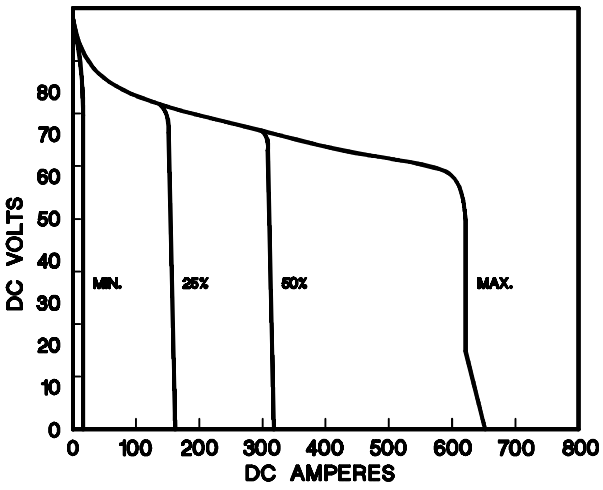
2-3. Volt-Ampere Curves



The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.

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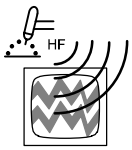
2-4. Typical Process Connections

⚠ WARNING



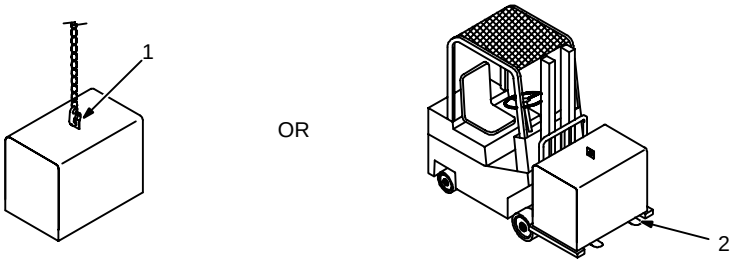
HIGH-FREQUENCY RADIATION can interfere with radio navigation, safety services, computers, and communications equipment.

- Have only qualified person familiar with electronic equipment perform this installation.
- Read and follow entire Section 6 for proper location and installation requirements for high-frequency equipment before installing unit.

swarn13.1 4/93

2-5. Selecting A Location And Moving Welding Power Source

Movement



1 Lifting Eye

2 Lifting Forks

Use lifting eye or lifting forks to move unit.

If using lifting forks, extend forks beyond opposite side of unit.

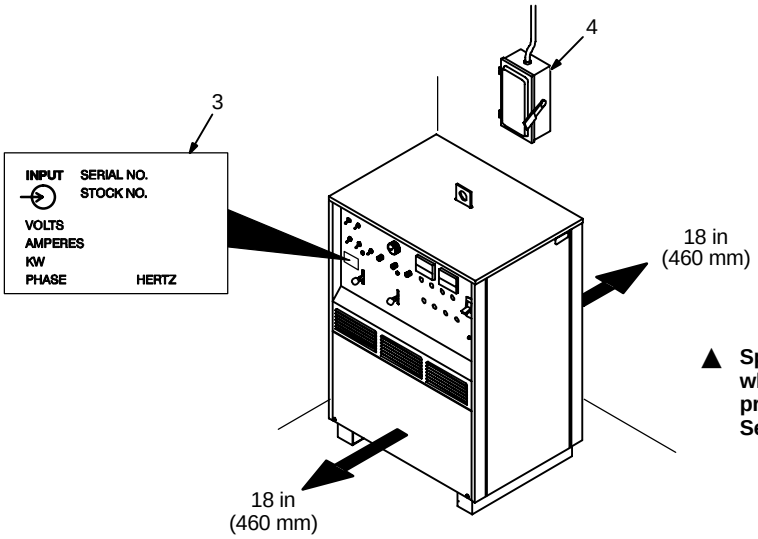
3 Rating Label

Use rating label to determine input power needs.

4 Line Disconnect Device

Locate unit near correct input power supply.

Location And Airflow



▲ **Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**

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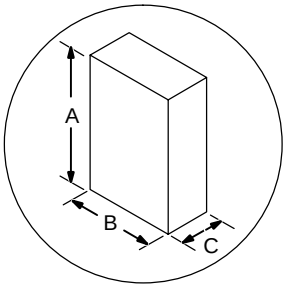
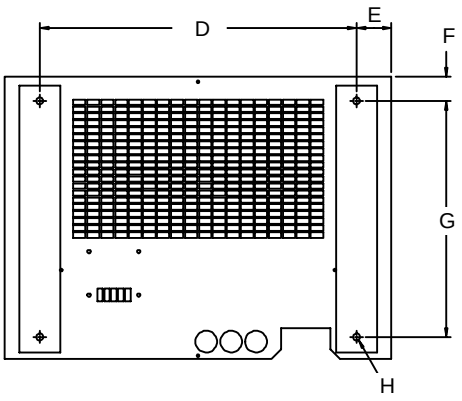
2-6. Overall Dimensions And Base Mounting Hole Layout

NOTE ☞	*Overall dimensions (A, B, and C) include lifting eye, handles, hardware, etc.*

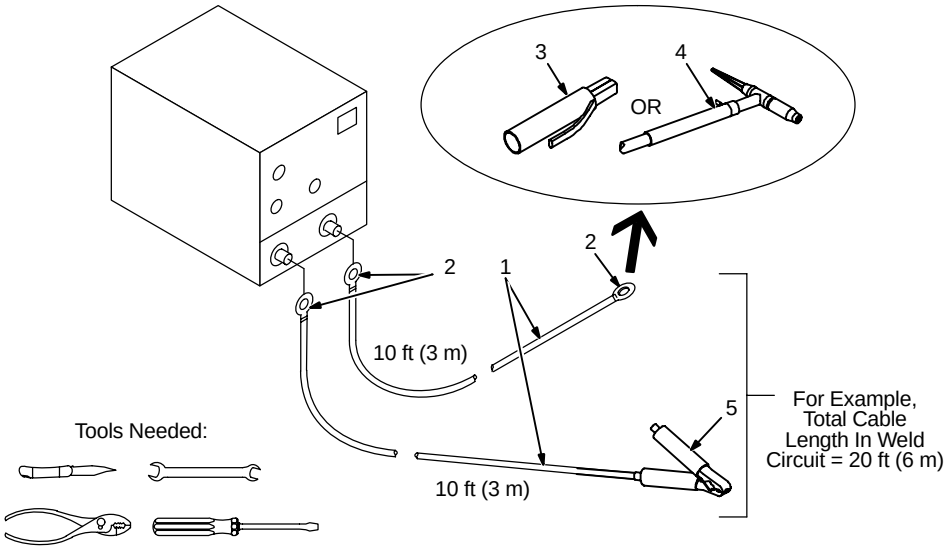




ST-800 338

	Inches	Millimeters
A	47	1193
B	31-1/4	794
C	22-3/4	577
D	25-1/2	648
E	2-13/16	71
F	1-15/16	49
G	19	483
H	9/16 Dia 4 Holes	14 Dia 4 Holes
Weight		
887 lb (402 kg)		

2-7. Selecting And Preparing Weld Output Cables



1 Weld Output Cable

Determine total cable length in weld circuit and maximum welding amperes. Use Section 2-8 to select proper cable size.

Use shortest cables possible.

Do not use damaged cables.

2 Terminal Lug

Use lugs of proper amperage capacity and hole size for connecting to work clamp or electrode holder, and weld output terminals.

3 Insulated Electrode Holder

4 GTAW Torch

Install according to manufacturer's instructions.

5 Work Clamp

Install onto work cable.

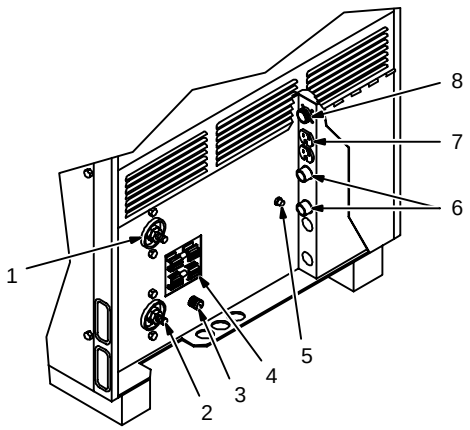
sb6.5* 5/94 – S-0752

2-8. Weld Cable Size*

Welding Amperes	Total Cable (Copper) Length In Weld Circuit Not Exceeding							
	100 ft (30 m) Or Less		150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	10 To 60% Duty Cycle	60 Thru 100% Duty Cycle	10 Thru 100% Duty Cycle					
100	4	4	4	3	2	1	1/0	1/0
150	3	3	2	1	1/0	2/0	3/0	3/0
200	3	2	1	1/0	2/0	3/0	4/0	4/0
250	2	1	1/0	2/0	3/0	4/0	2-2/0	2-2/0
300	1	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0
350	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0	2-4/0
400	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	2-4/0
500	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	3-3/0	3-3/0
600	3/0	4/0	2-2/0	2-3/0	2-4/0	3-3/0	3-4/0	3-4/0

*Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere. S-0007-D

2-9. Lower Front Panel



1 Work Output Terminal

2 Electrode Output Terminal

3 High Frequency Intensity Control (See Section 3-9)

4 Spark Gaps (See Section 4-2)

5 Circuit Breaker CB1 (See Section 2-11)

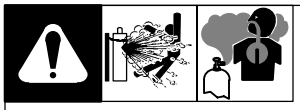
6 Gas Valve Fittings

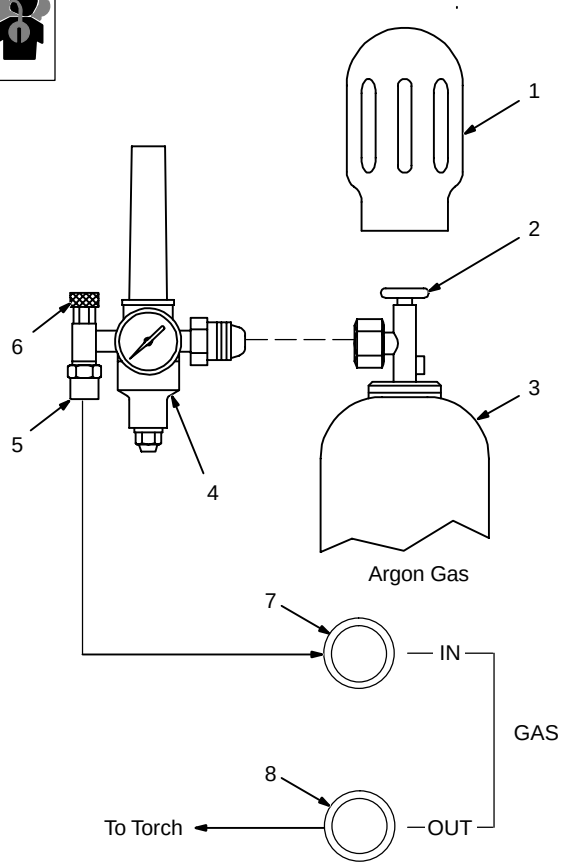
7 115 VAC Duplex Receptacle

8 Remote Contactor And Current Control Receptacle

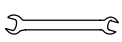
Ref. ST-144 405-B

2-10. Installing Gas Supply





Tools Needed:



5/8, 1-1/8 in

Chain cylinder to running gear, wall, or other stationary support so it cannot fall and break off valve.

1 Cap

2 Cylinder Valve

Remove cap, stand to side of valve, and open valve slightly. Gas flow blows dust and dirt from valve. Close valve.

3 Cylinder

4 Regulator/Flowmeter

Install so face is vertical.

5 Gas Hose Connection

Fitting has 5/8-18 right-hand threads. Obtain and install gas hose.

6 Flow Adjust

Typical flow rate is 15 cfh (cubic feet per hour).

Make sure flow adjust is closed when opening cylinder to avoid damage to the flowmeter.

7 Gas In Fitting

8 Gas Out Fitting

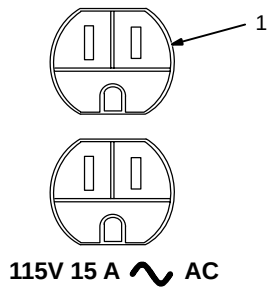
The gas In and gas Out fittings have 5/8-18 right-hand threads.

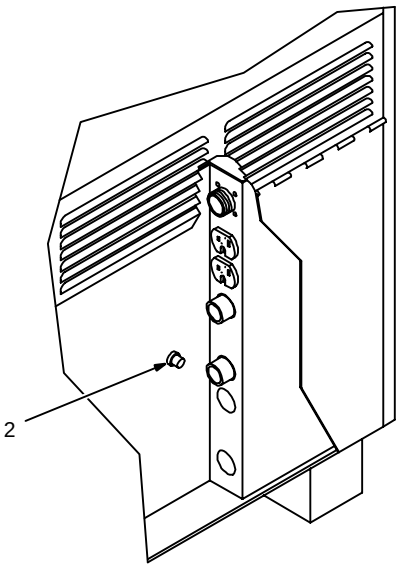
Connect hose as shown.

Close access door.

ssb3.3* 5/94 – Ref. ST-158 697- / Ref. C-085 461

2-11. 115 Volts AC Duplex Receptacle And Circuit Breaker





1 115 Volts AC Duplex Receptacle

This welding power source supplies up to 15 amperes of 115 volts ac power.

Receptacle is protected from overload by circuit breaker CB1.

2 Circuit Breaker CB1

CB1 protects the 115 volts ac winding of transformer T1 from overload. If CB1 opens, high frequency and output to the 115 volts ac duplex receptacle stop.

Press button to reset breaker. Close access door.

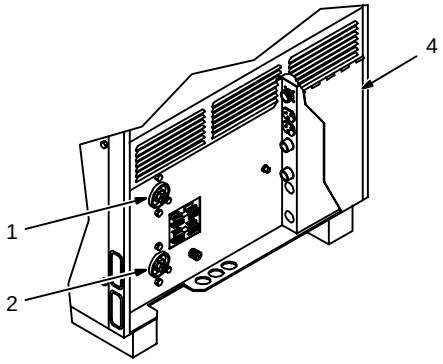
Ref. ST-144 405-B

2-12. Connecting To Weld Output Terminals

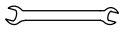
SERIOUS ELECTRIC SHOCK OR FIRE CAN RESULT FROM WELD CURRENT ON CASE and in ground conductor.

- Do not let torch cable adapter hit screwheads, access door, case, or any parts.
- Install adapter as shown.

Location of Terminals



Tools Needed:



▲ **Turn Off power before connecting to weld output terminals.**

1 Work Weld Output Terminal

2 Electrode Weld Output Terminal

3 Torch Cable Adapter

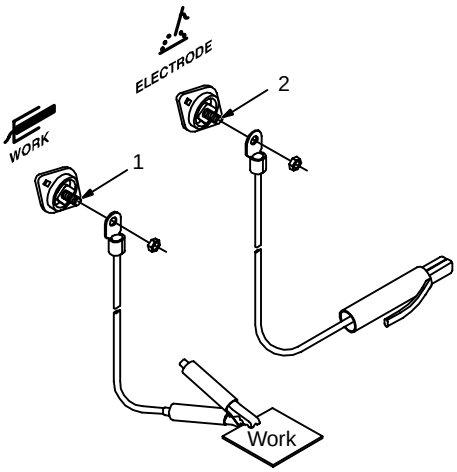
Adapter connects power and water to torch and cooling system or drain.

4 Access Door

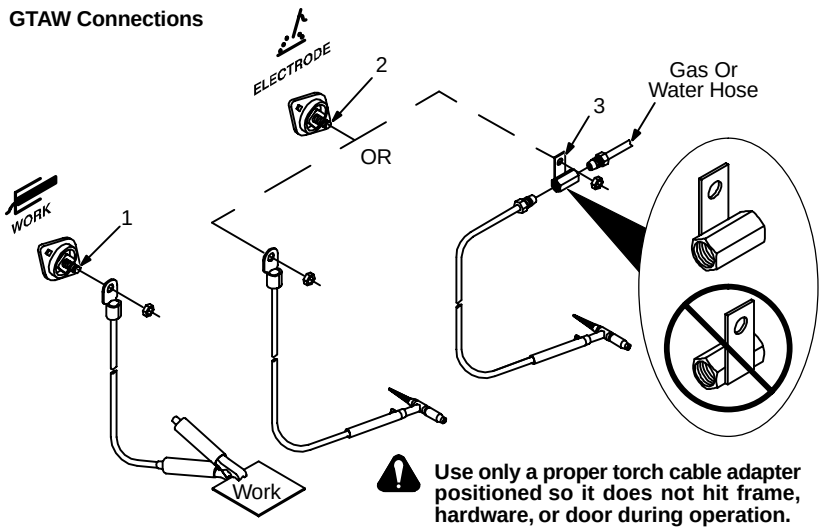
Connect cables as shown.

Close and secure access door.

SMAW Connections



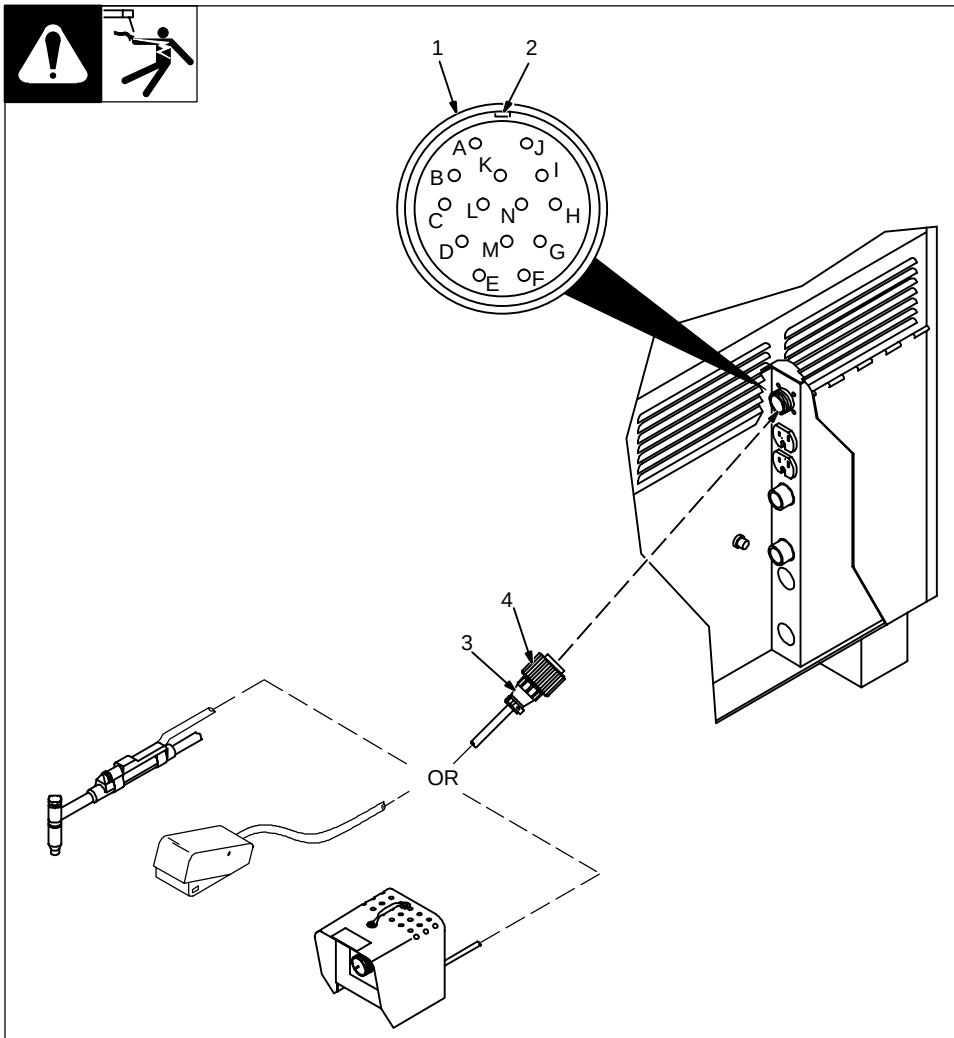
GTAW Connections



Use only a proper torch cable adapter positioned so it does not hit frame, hardware, or door during operation.

sb9.1 12/94 – Ref. ST-144 405-B / ST-800 578

2-13. Remote 14 Receptacle Information And Connections



1 Remote 14 Receptacle RC2 (See Section 2-14)

2 Keyway

3 Plug

4 Threaded Collar

To connect to receptacle, align keyway, insert plug, and tighten threaded collar.

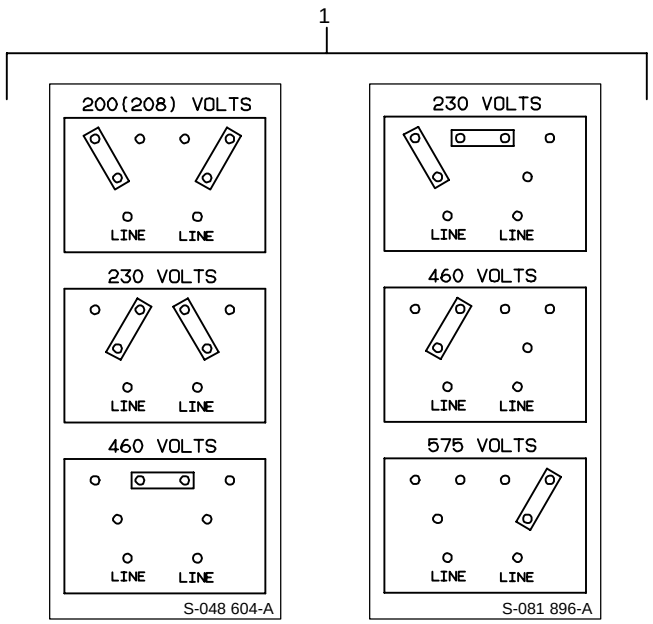
sb7.1 5/94 – Ref. ST-144 405-B / Ref. S-0004-A / S-0750

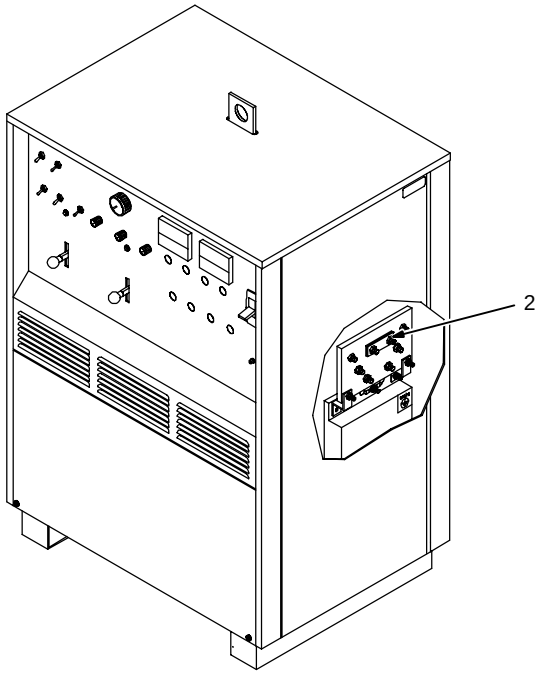
2-14. Remote 14 Socket Information

REMOTE 14	Socket*	Socket Information
OUTPUT (CONTACTOR)	A	24 volts ac.
	B	Contact closure to A completes 24 volts ac contactor control circuit.
A/V AMPERAGE VOLTAGE	C	+10 volts dc output to remote control.
	D	Remote control circuit common.
	E	0 to +10 volts dc input command signal from remote control.

*The remaining sockets are not used.

2-15. Positioning Jumper Links





▲ **Disconnect and lockout/tag-out input power before placing or moving jumper links.**

Jumper links allow operation on different input voltages and are factory set for the highest input voltage.

Check input voltage available at site.

Remove side panel to check jumper links.

1 Input Voltage Label – Only One Is On Unit

Look at jumper links and compare link position with unit label.

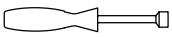
2 Input Voltage Jumper Links

Move links to match input voltage. For example, use 230 volts position when 230 volts input power is available.

Reinstall side panel or go on to Section 2-17.

Tools Needed:

1/2 in


3/8 in

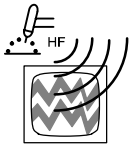
ssb5.1 2/92 – ST-800 337-B

2-16. Electrical Service Guide

Input Voltage	200	230	460	575
Input Amperes At Rated Output	206	180	90	72
Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes	300	250	125	110
Min Input Conductor Size In AWG/Kcmil	2/0	1/0	4	6
Max Recommended Input Conductor Length In Feet (Meters)	139 (42)	163 (50)	318 (97)	336 (102)
Min Grounding Conductor Size In AWG/Kcmil	4	4	6	6
Reference: 1993 National Electrical Code (NEC).				S-0092J

2-17. Connecting Input Power

⚠ WARNING



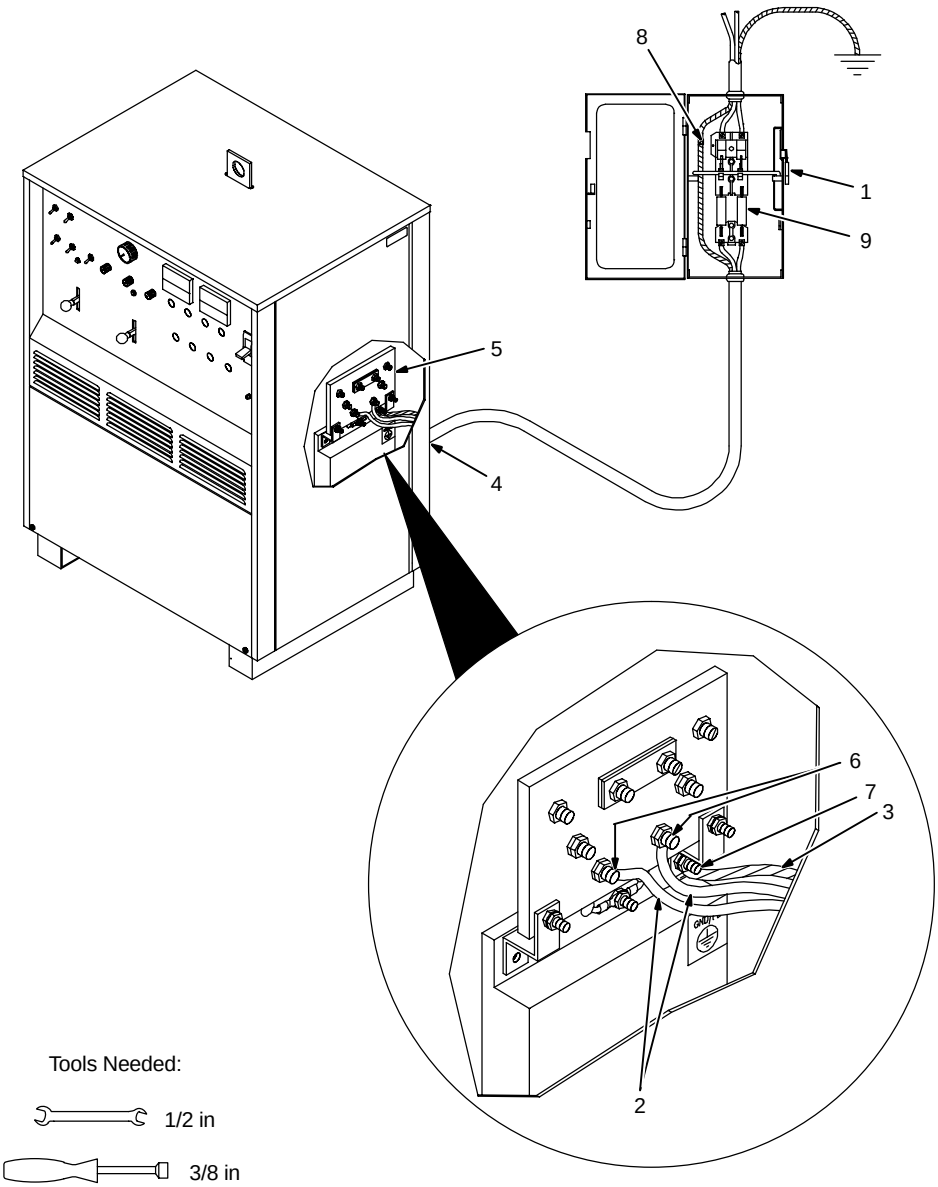
HIGH-FREQUENCY RADIATION can interfere with radio navigation, safety services, computers, and communications equipment.

- Have only qualified person familiar with electronic equipment perform this installation.
- Read and follow entire Section 6 for proper location and installation requirements for high-frequency equipment before installing unit.

ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Turn Off welding power source, and disconnect input power before inspecting or installing.
- Have only qualified persons install unit.
- Installation must meet National Electrical Code and all other codes.

swarn13.2 4/93



Tools Needed:

1/2 in

3/8 in

Have only qualified persons make this installation.

Remove side panel.

1 Line Disconnect Device Of Proper Rating

2 Input Conductors

3 Grounding Conductor

Select size and length using Section 2-16. Conductor rating must comply with national, state, and local electrical codes. Use lugs of proper amperage capacity and correct hole size.

4 Strain Relief Connector

Insert conductors through strain relief.

5 Input Terminal Board

6 Line Terminals

7 Welding Power Source Ground Terminal

Connect grounding conductor to ground terminal first. Then connect input conductors to line terminals.

8 Disconnect Device Ground Terminal

Install and connect grounding conductor and input conductors in conduit or equivalent to deenergized line disconnect device.

Connect grounding conductor first, then line input conductors.

Be sure grounding conductor goes to an earth ground.

Reinstall side panel.

9 Overcurrent Protection

Select type and size using Section 2-16. Install into deenergized line disconnect device (fused disconnect switch shown).

ssb2.4 1/94 – SB-127 873-C

SECTION 3 – OPERATION

⚠ WARNING

ELECTRIC SHOCK can kill.

- Always wear dry insulating gloves.
- Insulate yourself from work and ground.
- Do not touch live electrical parts.
- Keep all panels and covers securely in place.

FUMES AND GASES can be hazardous to your health.

- Keep your head out of the fumes.
- Ventilate area, or use breathing device.
- Read Material Safety Data Sheets (MSDSs) and manufacturer's instructions for material used.

WELDING can cause fire or explosion.

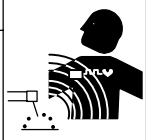
- Do not weld near flammable material.
- Watch for fire; keep extinguisher nearby.
- Do not locate unit over combustible surfaces.
- Do not weld on closed containers.
- Allow work and equipment to cool before handling.

ARC RAYS can burn eyes and skin; NOISE can damage hearing.

- Wear welding helmet with correct shade of filter.
- Wear correct eye, ear, and body protection.

MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep all doors, panels, covers, and guards closed and securely in place.



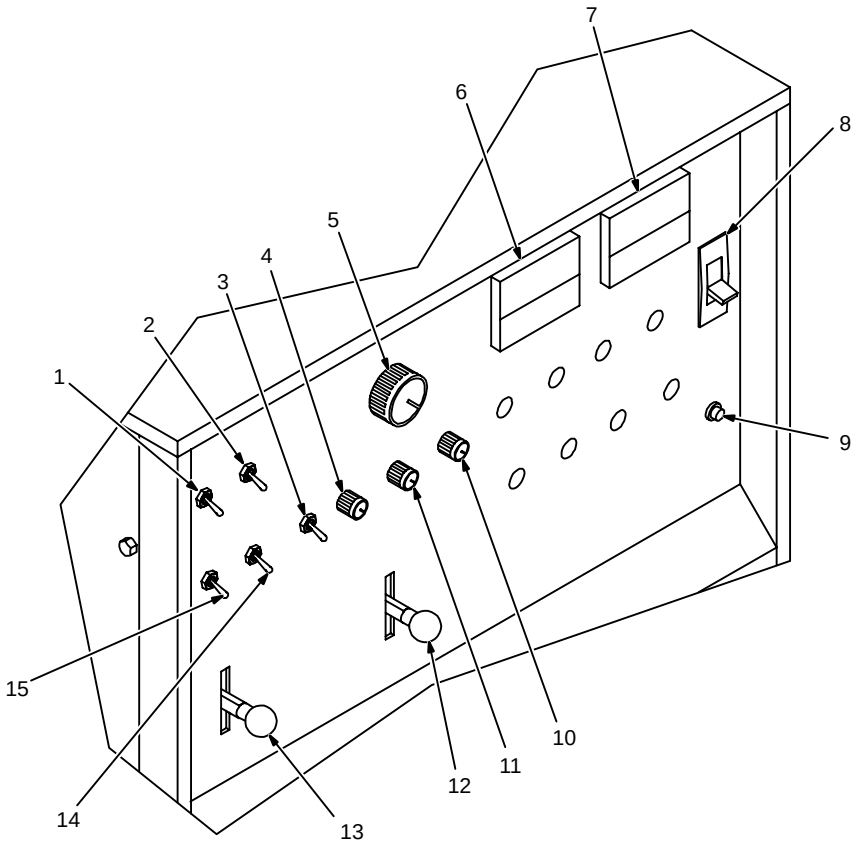
MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.

- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.

See Safety Precautions at beginning of manual for basic welding safety information.

swarn6.1 10/91

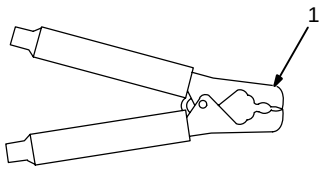
3-1. Controls



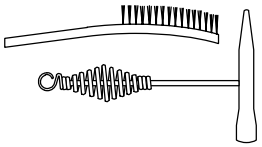
1 Output (Contactor) Switch
2 Amperage Control Switch
3 Start Amperage Switch
4 Start Amperage Control
5 Amperage Adjustment Control
6 Voltmeter
7 Ammeter
8 Power Switch
9 Pilot Light
10 Postflow Time Control
11 AC Balance Control
12 Polarity Switch
13 AC/DC Switch
14 Crater Fill Switch
15 High Frequency Switch

Ref. ST-144 405-B

3-2. Work Clamp



Tools Needed:



1 Work Clamp

Connect work clamp to a clean, paint-free location on workpiece, as close to weld area as possible.

Use wire brush or sandpaper to clean metal at weld joint area. Use chipping hammer to remove slag after welding.

sb4.1 2/93

3-3. AC/DC And Polarity Switches

ARCING can damage switch.

- Do not change AC/DC or Polarity switch position while welding.

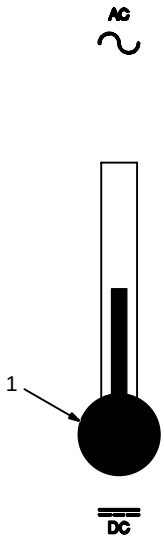
Arcing inside switch can damage contacts, causing switch to fail.

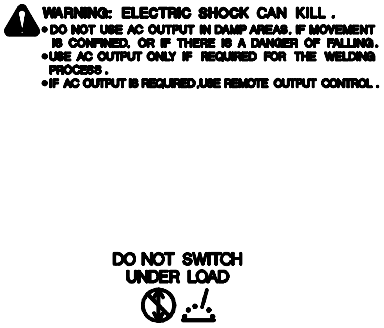
1 AC/DC Switch

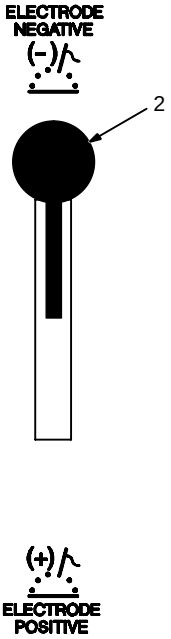
Use switch to select type of weld output.

2 Polarity Switch

Use switch to select either DC Electrode Positive (DCEP) or DC Electrode Negative (DCEN) output.

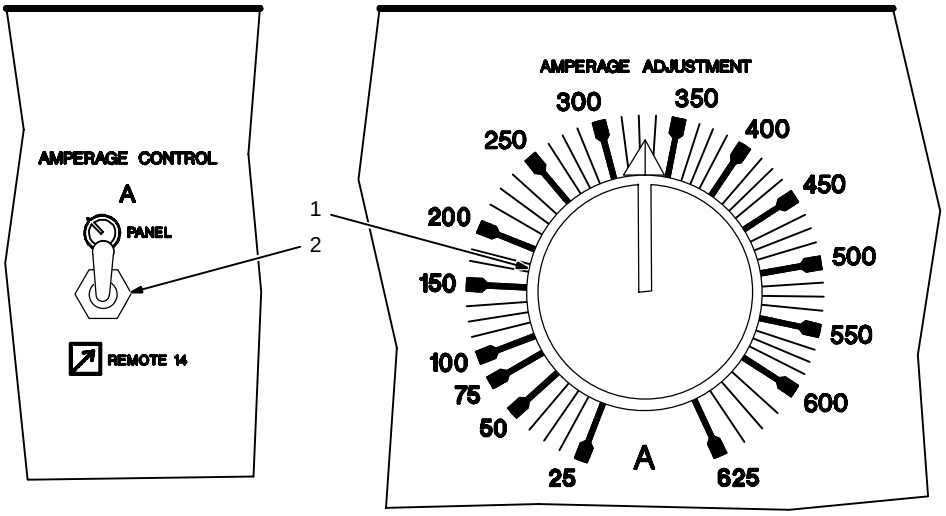






Ref. ST-116 740-A

3-4. Amperage Controls



1 Amperage Adjustment Control

Use control to select weld output amperage.

2 Amperage Control Switch

Use switch to select way of controlling amperage adjustment.

For front panel control, place switch in the Panel position.

For remote control, place switch in Remote 14 position (see Section 2-13).

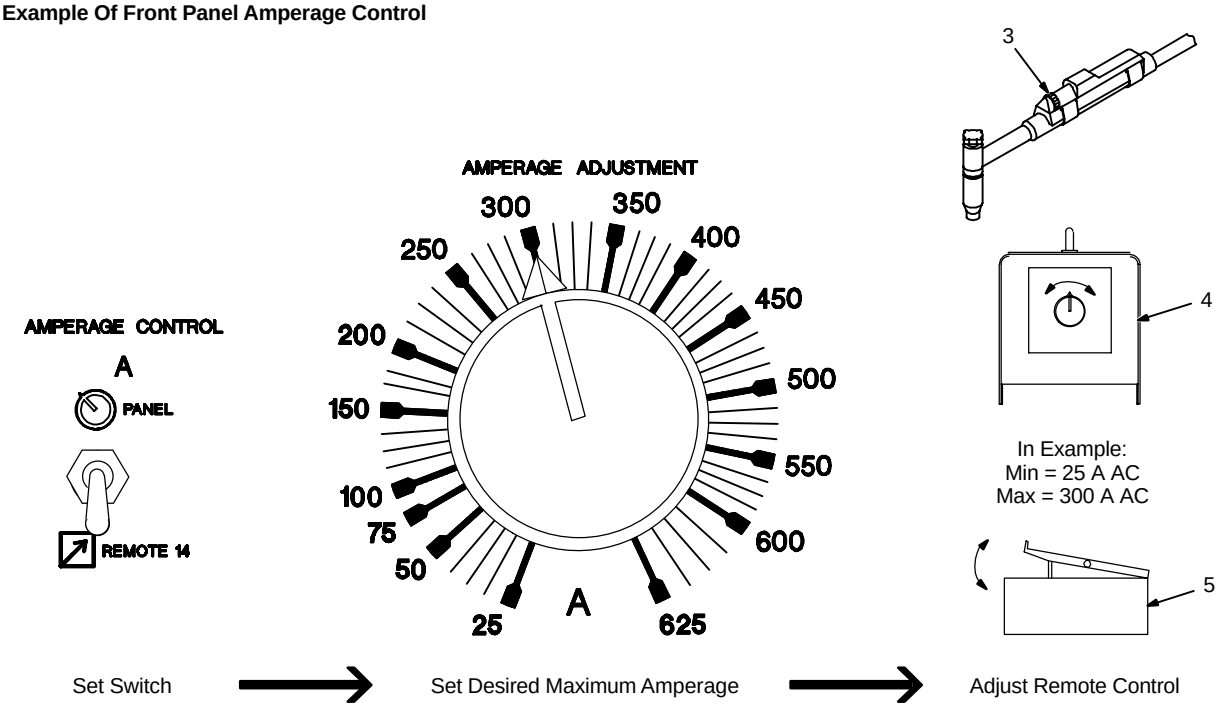
3 Fingertip Control

4 Remote Hand Control

5 Remote Foot Control

See example below.

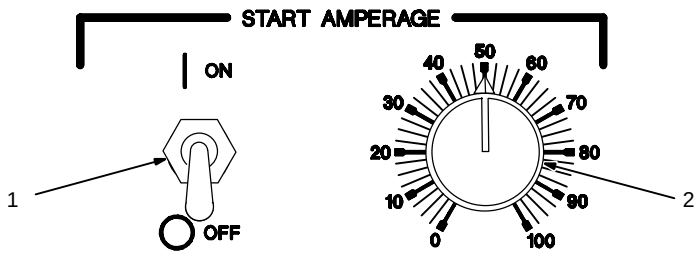
Example Of Front Panel Amperage Control



In Example:
Min = 25 A AC
Max = 300 A AC

Set Switch → Set Desired Maximum Amperage → Adjust Remote Control

3-5. Start Amperage Controls



1 Start Switch

On – provides start amperage control;
Off – no start amperage control.

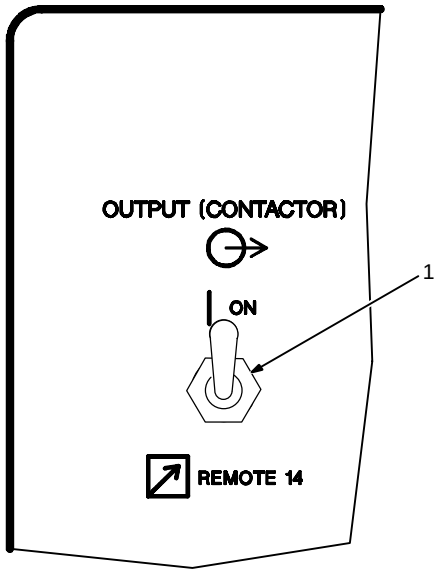
2 Start Amperage Control

Use control to select amperage level for arc starting that is different than Amperage Adjustment control setting.

The numbers are a percentage of the maximum welding amperage of the unit and not an actual value.

3-6. Output (Contactor) Switch

Weld output terminals are energized when switch is On and Power is On.



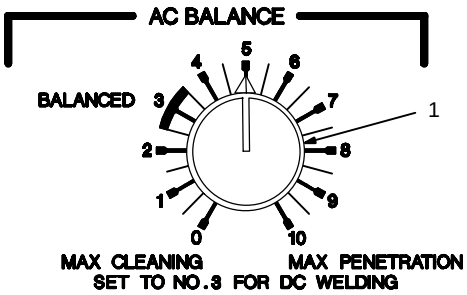
1 Output (Contactor) Switch

Use switch to select way of controlling unit output.

For weld output, place switch in On position.

For remote output control, place switch in Remote 14 position (see Section 2-13).

3-7. AC Balance Control



1 AC Balance Control

Use control to change the ac output square wave.

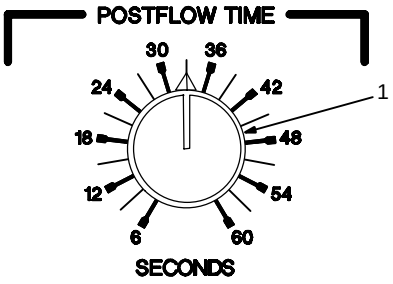
Turn control towards 10 to obtain deeper penetration. Turn control towards 0 to obtain more cleaning action of the workpiece. The wave shape of position 3 (balanced), provides equal penetration and cleaning action, and is a recommended starting point for GTAW.

Balance Control Waveform Examples

Balanced 3	50% Electrode Positive 50% Electrode Negative	
More Penetration 10	32% Electrode Positive 68% Electrode Negative	
More Cleaning 0	55% Electrode Positive 45% Electrode Negative	

S-0795-A

3-8. Postflow Time Control



1 Postflow Time Control

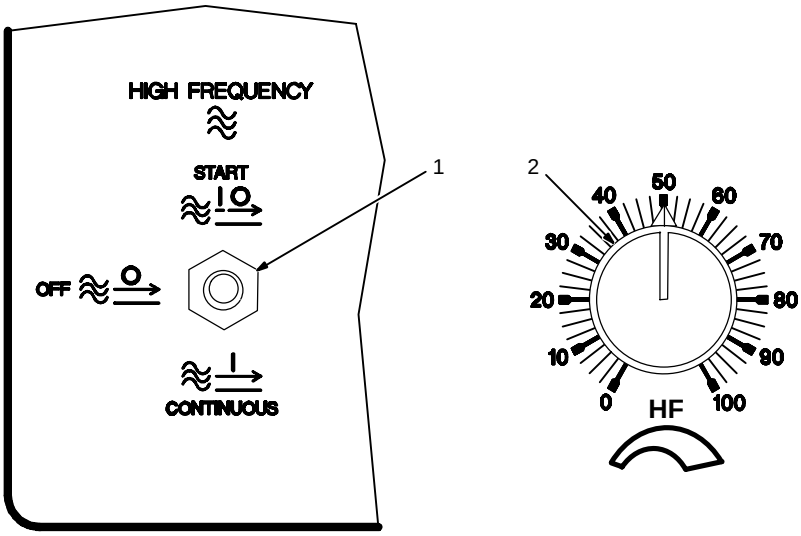
Use control to set the length of time in seconds gas (and coolant if applicable) flows after welding stops.

3-9. High Frequency Controls

⚠ WARNING

USING HIGH FREQUENCY WITH THE SHIELDED METAL ARC WELDING (SMAW) PROCESS can result in serious personal injury.

- Place the High Frequency switch in the Off position before using the Shielded Metal Arc Welding (SMAW) Process.



1 High Frequency Switch

Off – No HF. Use Off for SMAW welding.

Start – provides HF for arc starting only.

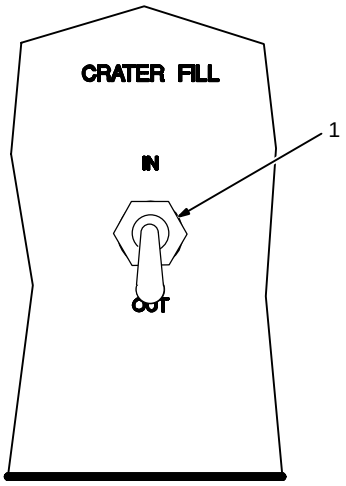
Continuous – provides HF continuously throughout the weld.

2 High Frequency Intensity Control (see Section 2-9)

Use control to change amount of HF energy used to start and maintain the arc. Set as low as practical to prevent interfering with electronic equipment. Numbers around the control are for reference only.

S-000 485

3-10. Crater Fill Switch



1 Crater Fill Switch

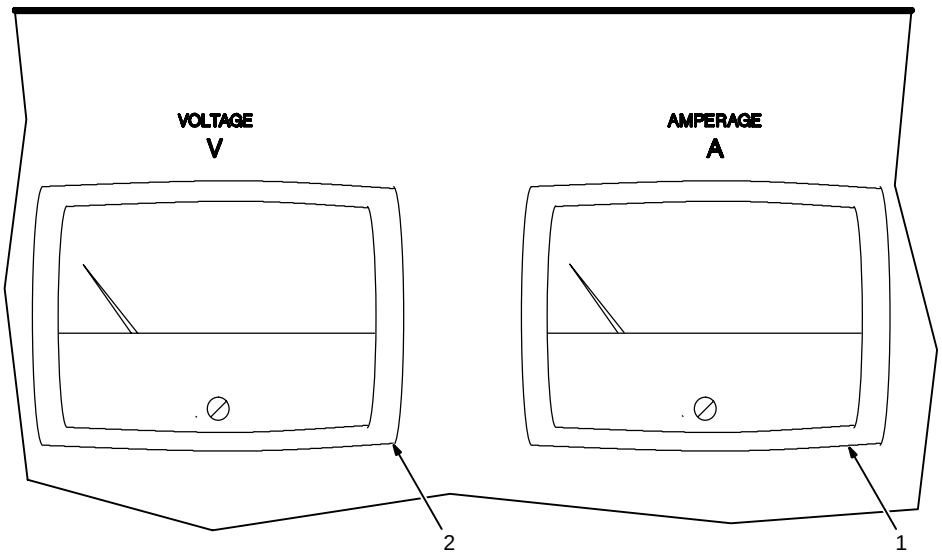
In – provides crater time;
Out – provides no crater time.

Place switch in the Out position for SMAW.

Use crater to taper weld output from setting of the Amperage Adjustment control to the minimum of the unit.

When using the crater time circuit, set Postflow Time Control (see Section 3-8) for at least 8 to 10 seconds.

3-11. Ammeter And Voltmeter



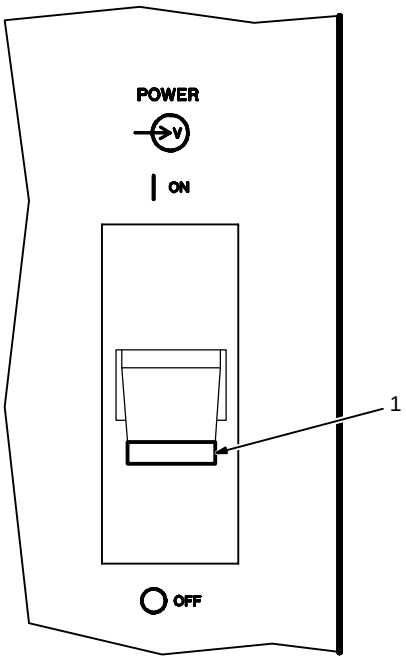
1 Ammeter

Ammeter displays weld amperage output of unit.

2 Voltmeter

Voltmeter displays voltage at the weld output terminals, but not necessarily the welding arc due to cable resistance, poor connections, etc.

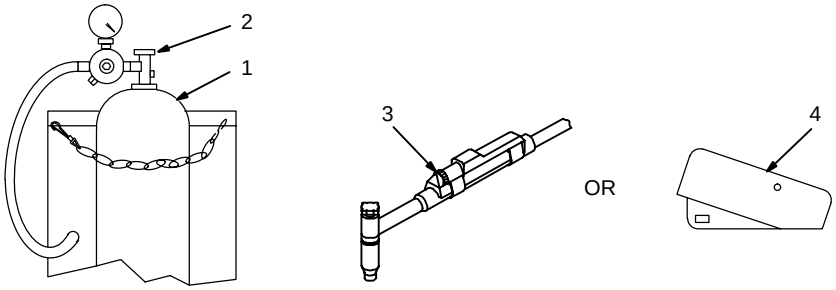
3-12. Power Switch



1 Power Switch

Use this switch to turn unit and pilot light On and Off.

3-13. Shielding Gas



1 Shielding Gas Cylinder

2 Valve

3 Fingertip Control

4 Foot Control

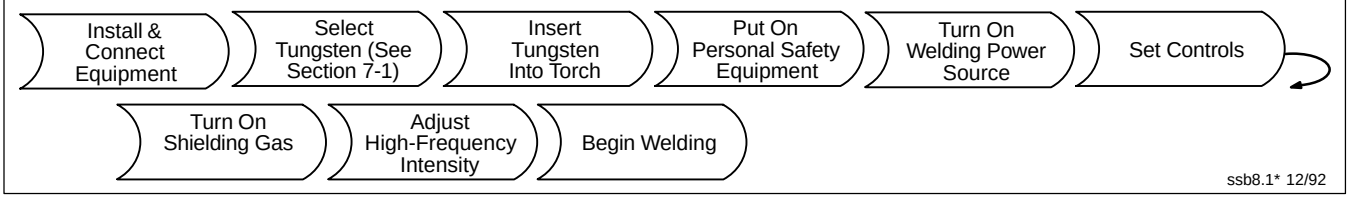
Open valve on cylinder just before welding.

Fingertip control or foot control turns weld output and gas flow on and off.

Close valve on cylinder when finished welding.

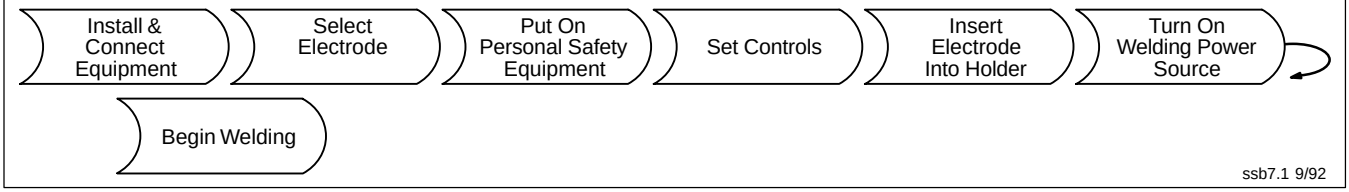
sb5.3* 5/94 – S-0621-C / S-0769

3-14. Sequence Of Gas Tungsten Arc Welding (GTAW)



ssb8.1* 12/92

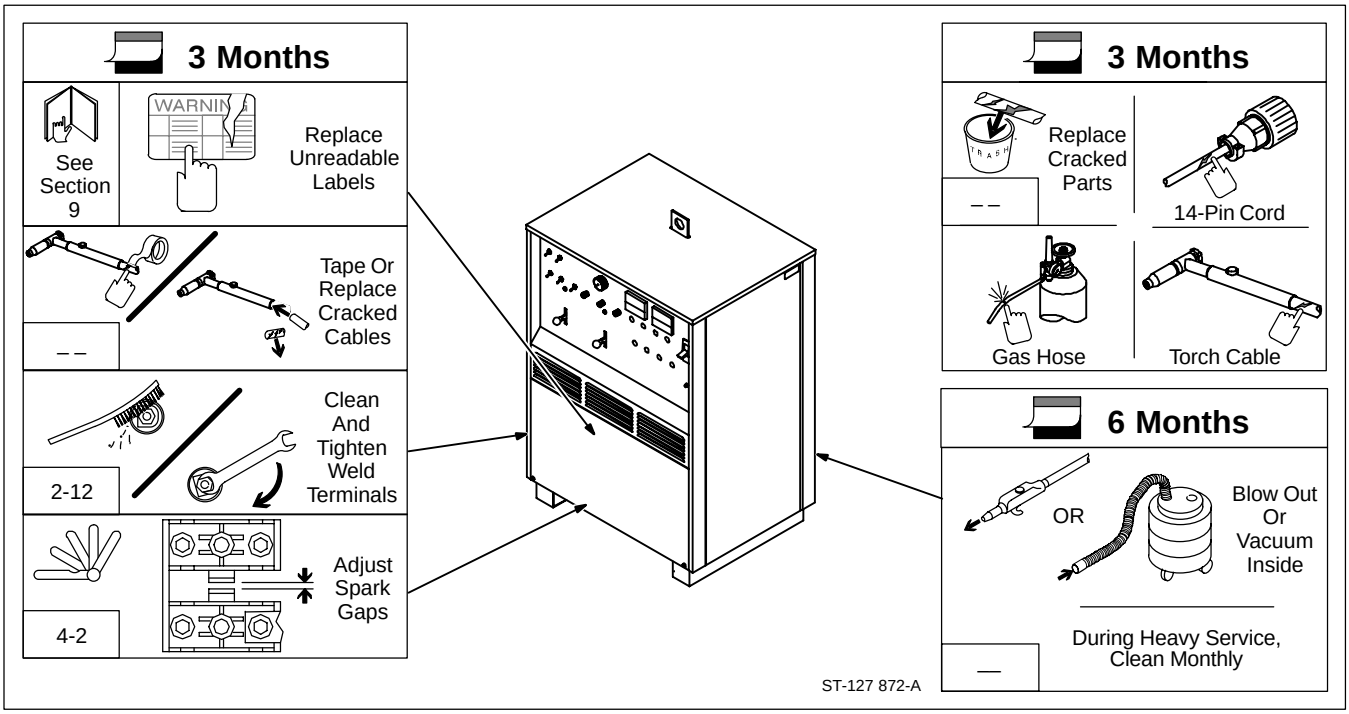
3-15. Sequence Of Shielded Metal Arc Welding (SMAW)



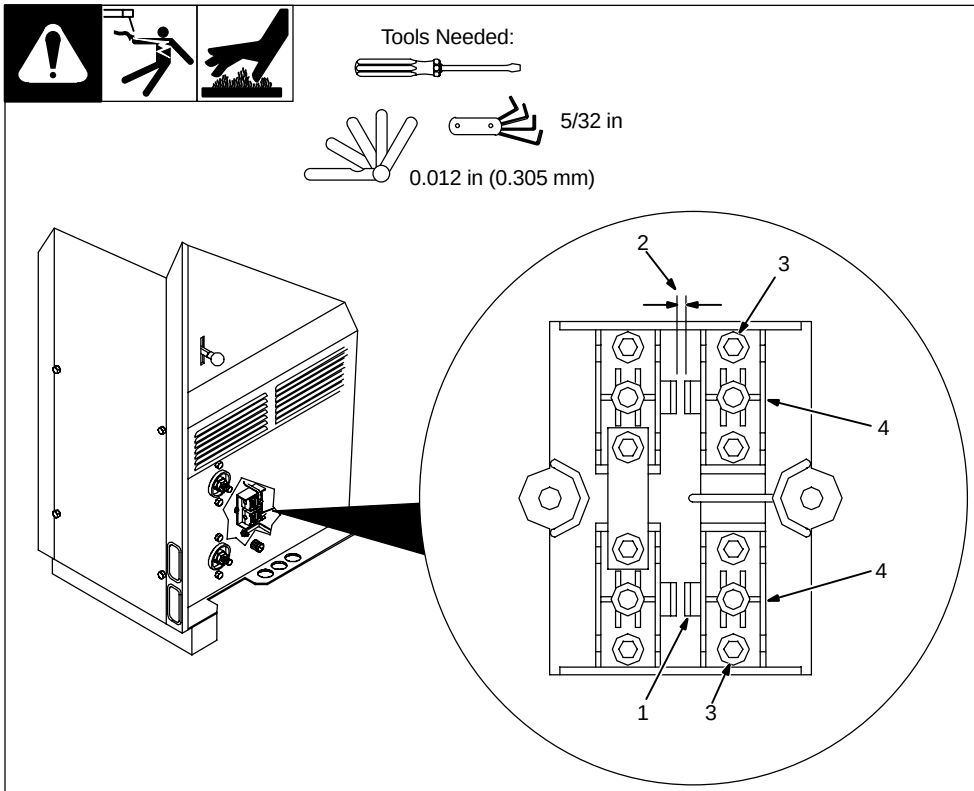
ssb7.1 9/92

SECTION 4 – MAINTENANCE & TROUBLESHOOTING

4-1. Routine Maintenance



4-2. Adjusting Spark Gaps



▲ Turn Off power before adjusting spark gaps.

Remove cover plate.

1 Tungsten End Of Point

Replace point if tungsten end disappears; do not clean or dress tungsten.

2 Spark Gap

Normal spark gap is 0.012 in (0.305 mm).

If adjustment is needed, proceed as follows:

3 Adjustment Screws

Loosen screws. Place gauge of proper thickness in spark gap.

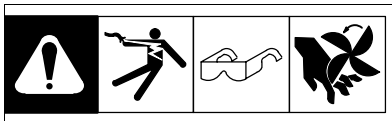
4 Pressure Point

Apply slight pressure at point until gauge is held firmly in gap. Tighten screws to 12 in/lbs torque (overtightening will deform plastic base). Adjust other gap.

Reinstall cover plate and close access door.

Ref. ST-144 405-C

4-3. Troubleshooting



Trouble	Remedy
No weld output; unit completely inoperative.	Place Power switch in On position (see Section 3-12).
	Place line disconnect switch in the On position (see Section 2-17).
	Check and replace line fuse(s) or reset circuit breakers (see Section 2-17).
	Check for proper input connections (see Section 2-17).
	Check for proper jumper link positions (see Section 2-15).
No weld output; fan on.	Place Output (Contactor) switch in On position, or place switch in Remote 14 position and connect remote contactor to Remote 14 receptacle (see Sections 2-13 and 3-6).
	Check, repair, or replace remote control.
	Have Factory Authorized Service Station/Service Distributor check control board PC1.
Unit provides only maximum or minimum weld output.	Have Factory Authorized Service Station/Service Distributor check control board PC1, and hall device HD1.
Weld output always above or always below set value.	Have Factory Authorized Service Station/Service Distributor check control board PC1, and hall device HD1.
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 2-7).
	Clean and tighten all weld connections (see Sections 2-7 and 2-12).
	Be sure AC/DC switch and Polarity switch are in proper position for welding process (see Section 3-3).
	Have Factory Authorized Service Station/Service Distributor check control board PC1, and hall device HD1.
No AC Balance Control.	Have Factory Authorized Service Station/Service Distributor check and replace AC Balance Control, if necessary, and check control board PC1 (see Section 3-7).
No control of weld output.	Place Amperage Control switch in Panel position, or place switch in Remote 14 position and connect remote control to Remote 14 receptacle (see Sections 2-13 and 3-4).
	Have Factory Authorized Service Station/Service Distributor replace Amperage Adjustment control or check control board PC1 (see Section 3-4).
No output from duplex receptacle RC1, no gas flow, and no high frequency.	Check, and reset circuit breaker CB1 if necessary (see Section 2-11).
No high frequency; difficulty in establishing GTAW arc.	Check, and reset circuit breaker CB1 if necessary (see Section 2-11).
	Select proper size tungsten (see Section 7-1).
	Check High Frequency Intensity control setting (see Section 3-9).
	Be sure that electrode holder cable is not close to any grounded metal.
	Check cables and torch for cracked insulation or bad connections. Repair or replace necessary parts.
	Check spark gaps and adjust if necessary (see Section 4-2).
Wandering arc – poor control of direction of arc.	Reduce gas flow rate (see Section 2-10).
	Select proper size tungsten (see Section 7-1).
	Properly prepare tungsten (see Section 7-2).
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts.
	Increase postflow time (see Section 3-8).
	Check and tighten all gas fittings (see Section 2-10).
	Properly prepare tungsten (see Section 7-2).
	Replace torch parts if water has leaked into torch.

SECTION 5 – ELECTRICAL DIAGRAM

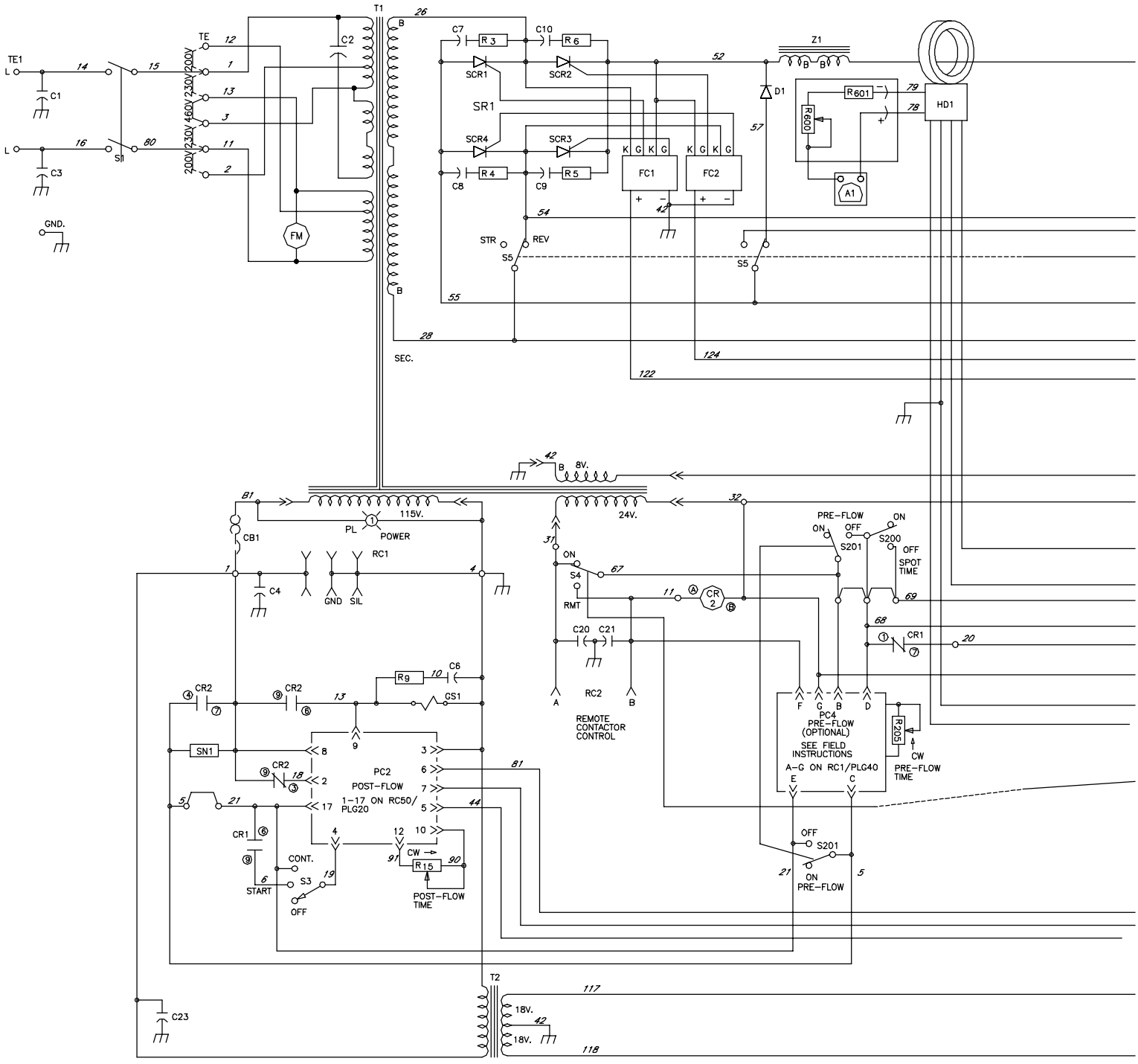
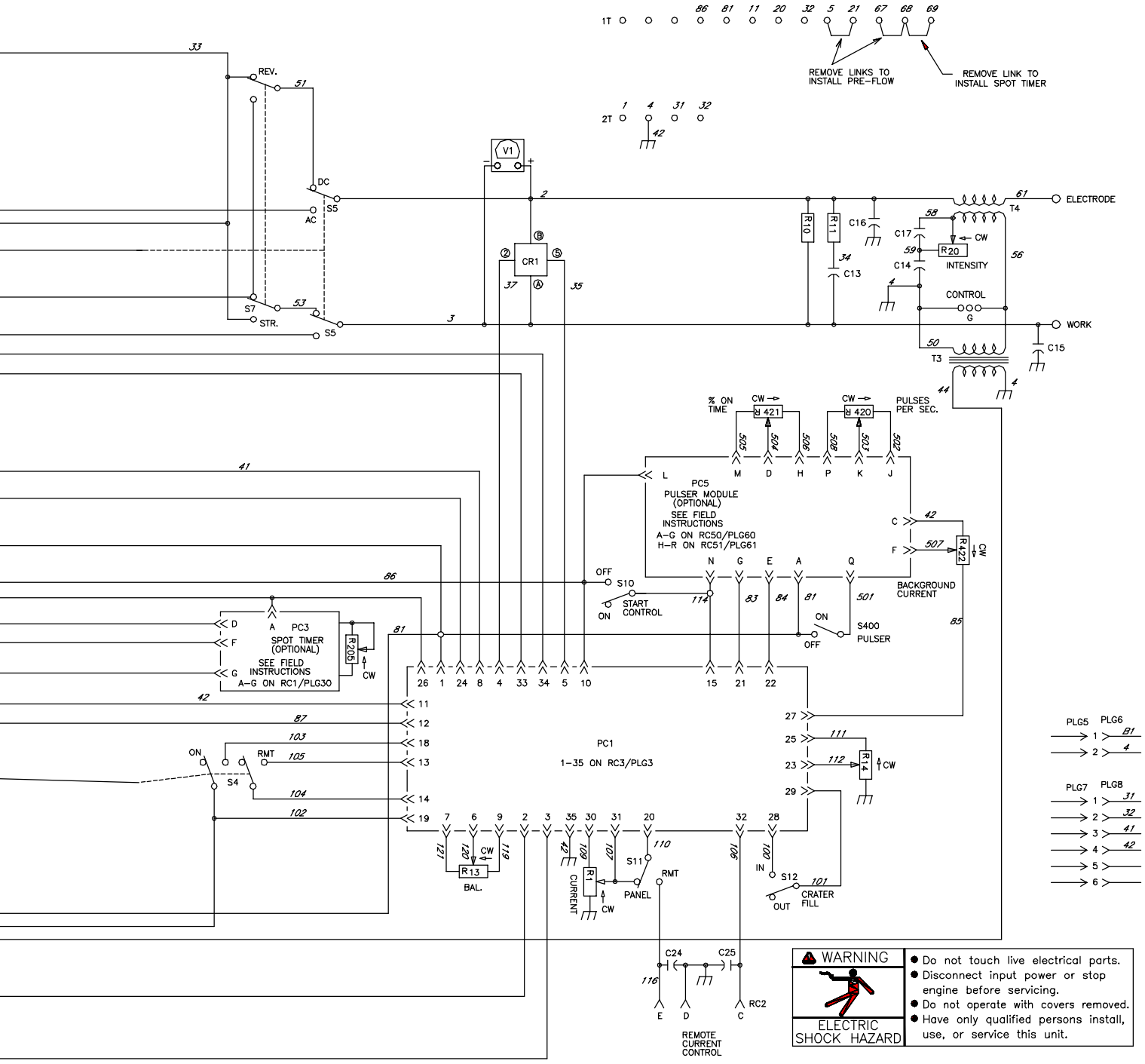


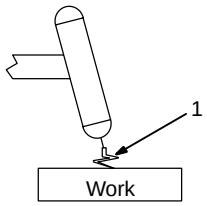
Figure 5-1. Circuit Diagram For Welding Power Source


1T
86 81 11 20 32 5 21 67 68 69
REMOVE LINKS TO INSTALL PRE-FLOW
REMOVE LINK TO INSTALL SPOT TIMER
2T
1 4 31 32
42
33
REV.
51
DC
AC
S5
S7
STR.
53
V1
2
CR1
37
35
3
R10
R11
C16
C13
34
C17
CW
R20
INTENSITY
C14
59
58
56
4
CONTROL
G
T4
61
ELECTRODE
WORK
50
T3
C15
44
4
% ON TIME
CW
R 421
CW
R 420
PULSES PER SEC.
505 504 506 508 503 502
M D H P K J
L
PC5
PULSER MODULE (OPTIONAL)
SEE FIELD INSTRUCTIONS
A–G ON RC50/PLG60
H–R ON RC51/PLG61
41
C
42
F
507
R422
CW
N G E A Q
BACKGROUND CURRENT
86
OFF
S10
ON
START CONTROL
114
83
84
81
501
ON
S400
PULSER
OFF
85
D
A PC3
F
SPOT TIMER (OPTIONAL)
SEE FIELD INSTRUCTIONS
A–G ON RC1/PLG30
G
R205
CW
81
26 1 24 8 4 33 34 5 10
15 21 22
42
11
12
18
13
14
19
87
103
105
104
102
ON
S4
RMT
PC1
1–35 ON RC3/PLG3
27
25
23
29
111
112
R14
CW
7 6 9 2 3 35 30 31 20
32 28
121 120 CW 119
R13
BAL.
42 109 107
R1
CURRENT
CW
S11
110
PANEL
RMT
106
IN
100
S12
OUT
101
CRATER FILL
116
C24
C25
E D C
RC2
REMOTE CURRENT CONTROL
PLG5 PLG6
1 B1
2 4
PLG7 PLG8
1 31
2 32
3 41
4 42
5
6
WARNING
ELECTRIC SHOCK HAZARD
Do not touch live electrical parts.
Disconnect input power or stop engine before servicing.
Do not operate with covers removed.
Have only qualified persons install, use, or service this unit.

SD-202 703-A

SECTION 6 – HIGH FREQUENCY

6-1. Welding Processes Requiring High Frequency



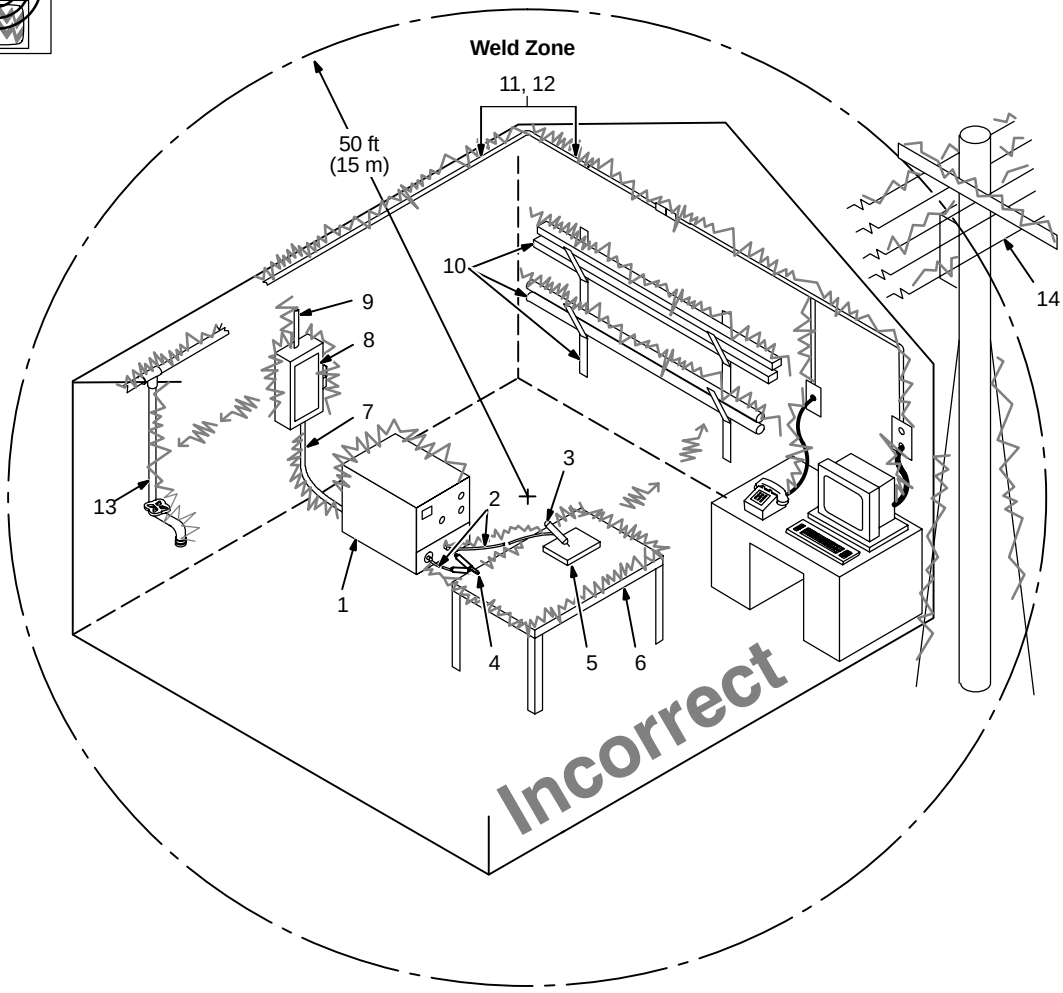
TIG

1 High-Frequency Voltage

TIG – helps arc jump air gap between torch and workpiece and/or stabilize the arc.

high_freq 12/96 – S-0693

6-2. Incorrect Installation



Sources of Direct High-Frequency Radiation

1 High-Frequency Source (welding power source with built-in HF or separate HF unit)
2 Weld Cables
3 Torch
4 Work Clamp
5 Workpiece
6 Work Table

Sources of Conduction of High Frequency

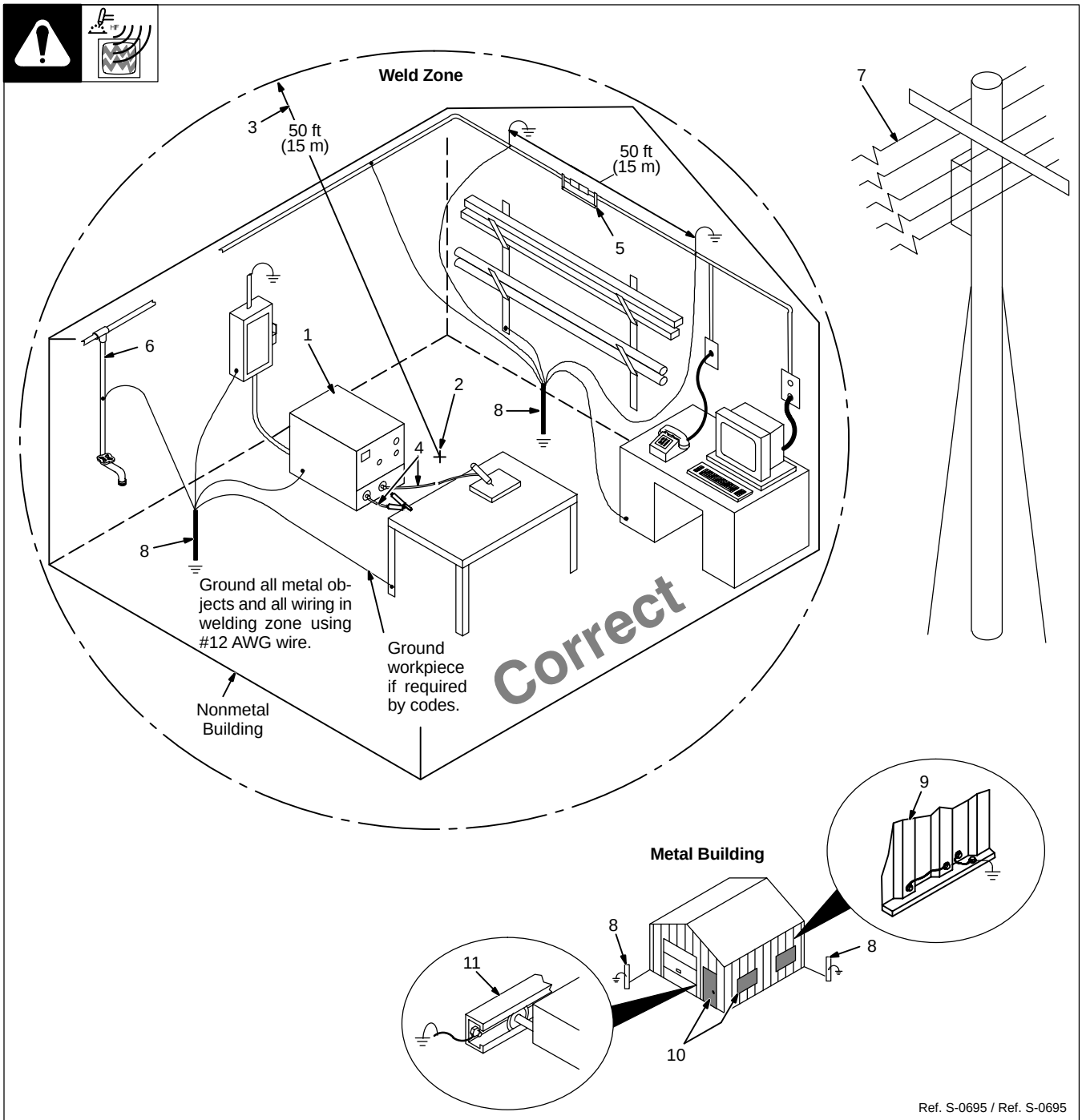
7 Input Power Cable
8 Line Disconnect Device
9 Input Supply Wiring

Sources of Reradiation of High Frequency

10 Ungrounded Metal Objects
11 Lighting
12 Wiring
13 Water Pipes and Fixtures
14 External Phone and Power Lines

S-0694

6-3. Correct Installation



Ref. S-0695 / Ref. S-0695

1 High-Frequency Source (welding power source with built-in HF or separate HF unit)

Ground metal machine case, work output terminal, line disconnect device, input supply, and worktable.

2 Center Point of Welding Zone

Midpoint between high-frequency source and welding torch.

3 Welding Zone

A circle 50 ft (15 m) from center point in all directions.

4 Weld Output Cables

Keep cables short and close together.

5 Conduit Joint Bonding and Grounding

Electrically join (bond) all conduit sections using copper straps or braided wire. Ground conduit every 50 ft (15 m).

6 Water Pipes and Fixtures

Ground water pipes every 50 ft (15 m).

7 External Power or Telephone Lines

Locate high-frequency source at least 50 ft (15 m) away from power and phone lines.

8 Grounding Rod

Consult the National Electrical Code for specifications.

Metal Building Requirements

9 Metal Building Panel Bonding Methods

Bolt or weld building panels together, install copper straps or braided wire across seams, and ground frame.

10 Windows and Doorways

Cover all windows and doorways with grounded copper screen of not more than 1/4 in (6.4 mm) mesh.

11 Overhead Door Track

Ground the track.

SECTION 7 – SELECTING AND PREPARING TUNGSTEN ELECTRODE FOR DC OR AC WELDING

▲ **Whenever possible and practical, use DC weld output instead of AC weld output.**

7-1. Selecting Tungsten Electrode (Wear Clean gloves To Prevent Contamination Of Tungsten)

Electrode Diameter	Amperage Range - Gas Type♦ - Polarity			
	DC – Argon – Electrode Negative/Straight Polarity	DC – Argon – Electrode Positive/Reverse Polarity	AC – Argon	AC – Argon – Balanced Wave
2% Ceria (Orange Band), 1.5% Lanthanum (Gray Band), Or 2% Thorium (Red Band) Alloy Tungstens				
.010”	Up to 25	*	Up to 20	Up to 15
.020”	15-40	*	15-35	5-20
.040”	25-85	*	20-80	20-60
1/16”	50-160	10-20	50-150	60-120
3/32”	135-235	15-30	130-250	100-180
1/8”	250-400	25-40	225-360	160-250
5/32”	400-500	40-55	300-450	200-320
3/16”	500-750	55-80	400-500	290-390
1/4”	750-1000	80-125	600-800	340-525
Pure Tungsten (Green Band)				
.010”	Up to 15	*	Up to 15	Up to 10
.020”	5-20	*	5-20	10-20
.040”	15-80	*	10-60	20-30
1/16”	70-150	10-20	50-100	30-80
3/32”	125-225	15-30	100-160	60-130
1/8”	225-360	25-40	150-210	100-180
5/32”	360-450	40-55	200-275	160-240
3/16”	450-720	55-80	250-350	190-300
1/4”	720-950	80-125	325-450	250-400
Zirconium Alloyed Tungsten (Brown Band)				
.010”	*	*	Up to 20	Up to 15
.020”	*	*	15-35	5-20
.040”	*	*	20-80	20-60
1/16”	*	*	50-150	60-120
3/32”	*	*	130-250	100-180
1/8”	*	*	225-360	160-250
5/32”	*	*	300-450	200-320
3/16”	*	*	400-550	290-390
1/4”	*	*	600-800	340-525

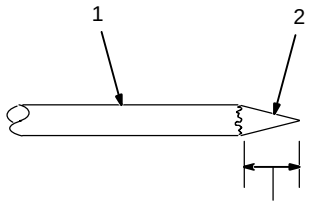
♦Typical argon shielding gas flow rates are 15 to 35 cfh (cubic feet per hour). *Not Recommended.

Figures listed are a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

7-2. Preparing Tungsten Electrode For Welding

▲ **Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using tungsten containing ceria, lanthana, or yttria instead of thoria. Grinding dust from thoriated electrodes contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.**

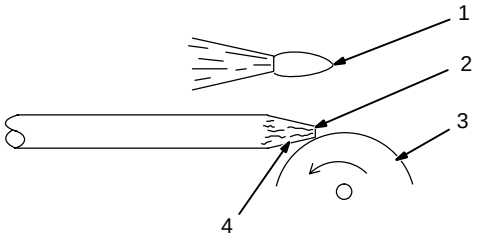
A. Preparing Tungsten For DC Electrode Negative (DCEN) Welding Or AC Welding With Inverter Machines



1 Tungsten Electrode

2 Tapered End

Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.



Ideal Tungsten Preparation – Stable Arc

1 Stable Arc

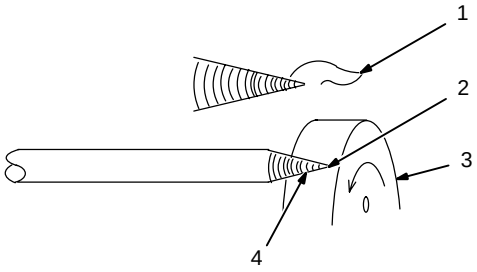
2 Flat

Diameter of this flat determines amperage capacity.

3 Grinding Wheel

Grinding wheel should be dedicated to grinding tungsten only.

4 Straight Ground



Wrong Tungsten Preparation – Wandering Arc

1 Arc Wander

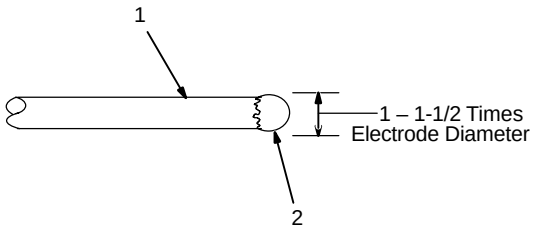
2 Point

3 Grinding Wheel

Grinding wheel should be dedicated to grinding tungsten only.

4 Radial Ground

B. Preparing Tungsten For Conventional AC Welding



1 Tungsten Electrode

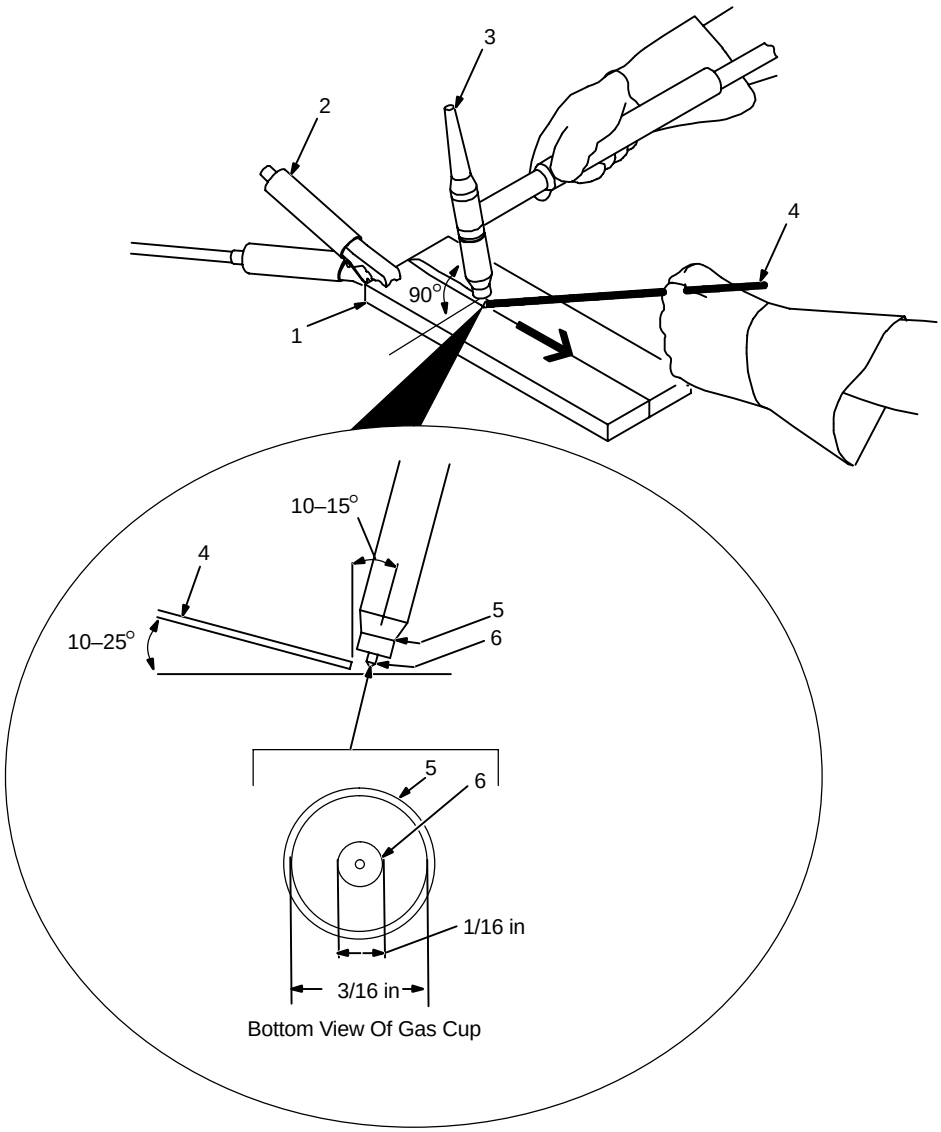
2 Balled End

▲ **Understand and follow safety symbols at start of Section 8-1 before preparing tungsten.**

Ball end of tungsten by applying AC amperage recommended for a given electrode diameter (see Section 7-1). Let ball on end of the tungsten take its own shape.

SECTION 8 – GUIDELINES FOR TIG WELDING (GTAW)

8-1. Positioning The Torch



▲ **Weld current can damage electronic parts in vehicles. Disconnect both battery cables before welding on a vehicle. Place work clamp as close to the weld as possible.**

☞ *For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding (GTAW) process.*

1 Workpiece

Make sure workpiece is clean before welding.

2 Work Clamp

Place as close to the weld as possible.

3 Torch

4 Filler Rod (If Applicable)

5 Gas Cup

6 Tungsten Electrode

Select and prepare tungsten according to Sections 7-1 and 7-2.

Guidelines:

The inside diameter of the gas cup should be at least three times the tungsten diameter to provide adequate shielding gas coverage. (For example, if tungsten is 1/16 in diameter, gas cup should be a minimum of 3/16 in diameter.

Tungsten extension is the distance the tungsten extends out gas cup of torch.

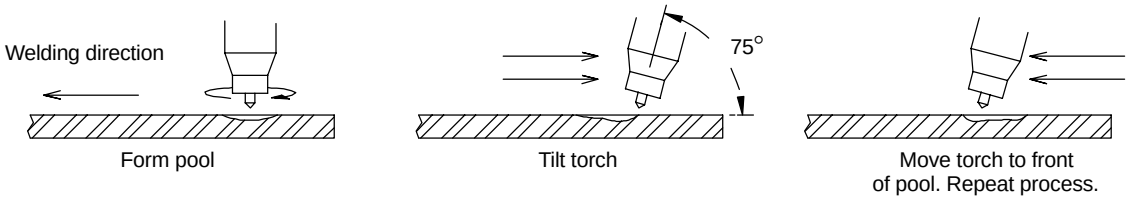
The tungsten extension should be no greater than the inside diameter of the gas cup.

Arc length is the distance from the tungsten to the workpiece.

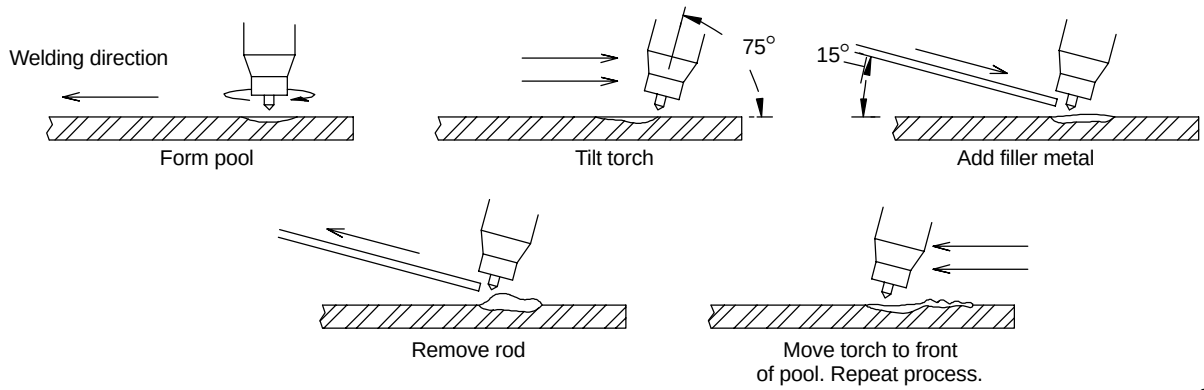
Ref. ST-161 892

8-2. Torch Movement During Welding

Tungsten Without Filler Rod



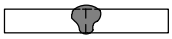
Tungsten With Filler Rod

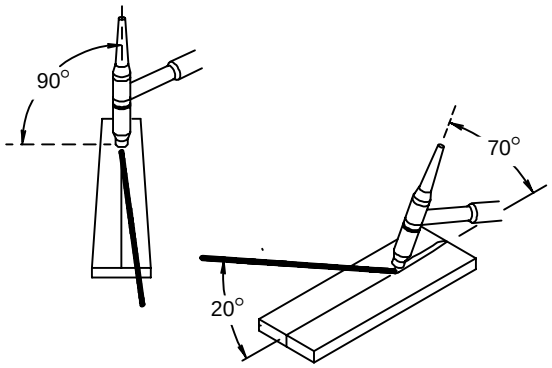


ST-162 002-B

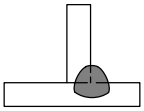
8-3. Positioning Torch Tungsten For Various Weld Joints

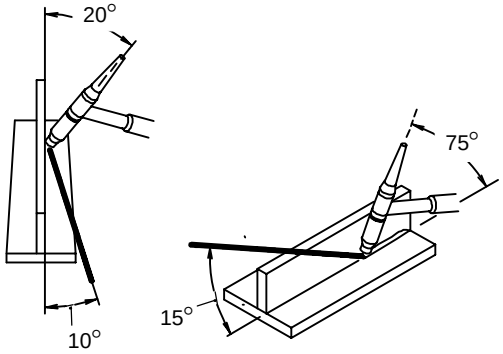
Butt Weld And Stringer Bead



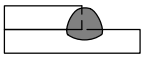


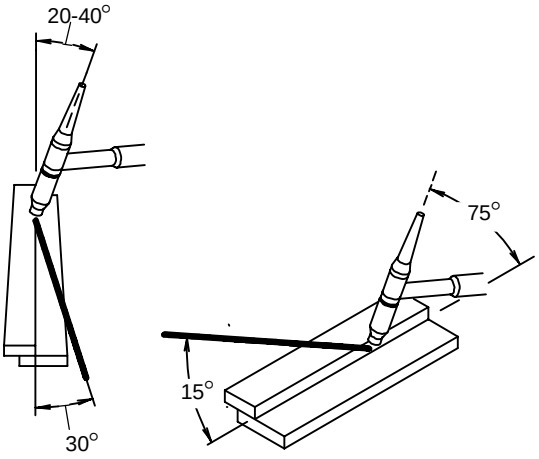
"T" Joint



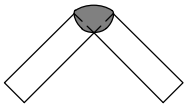


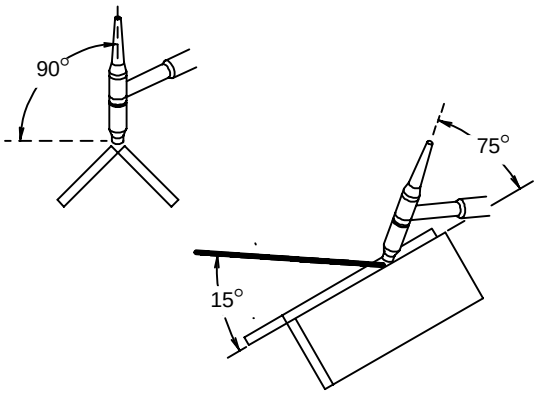
Lap Joint





Corner Joint





ST-162 003 / S-0792

Notes

☞ *Hardware is common and not available unless listed.*

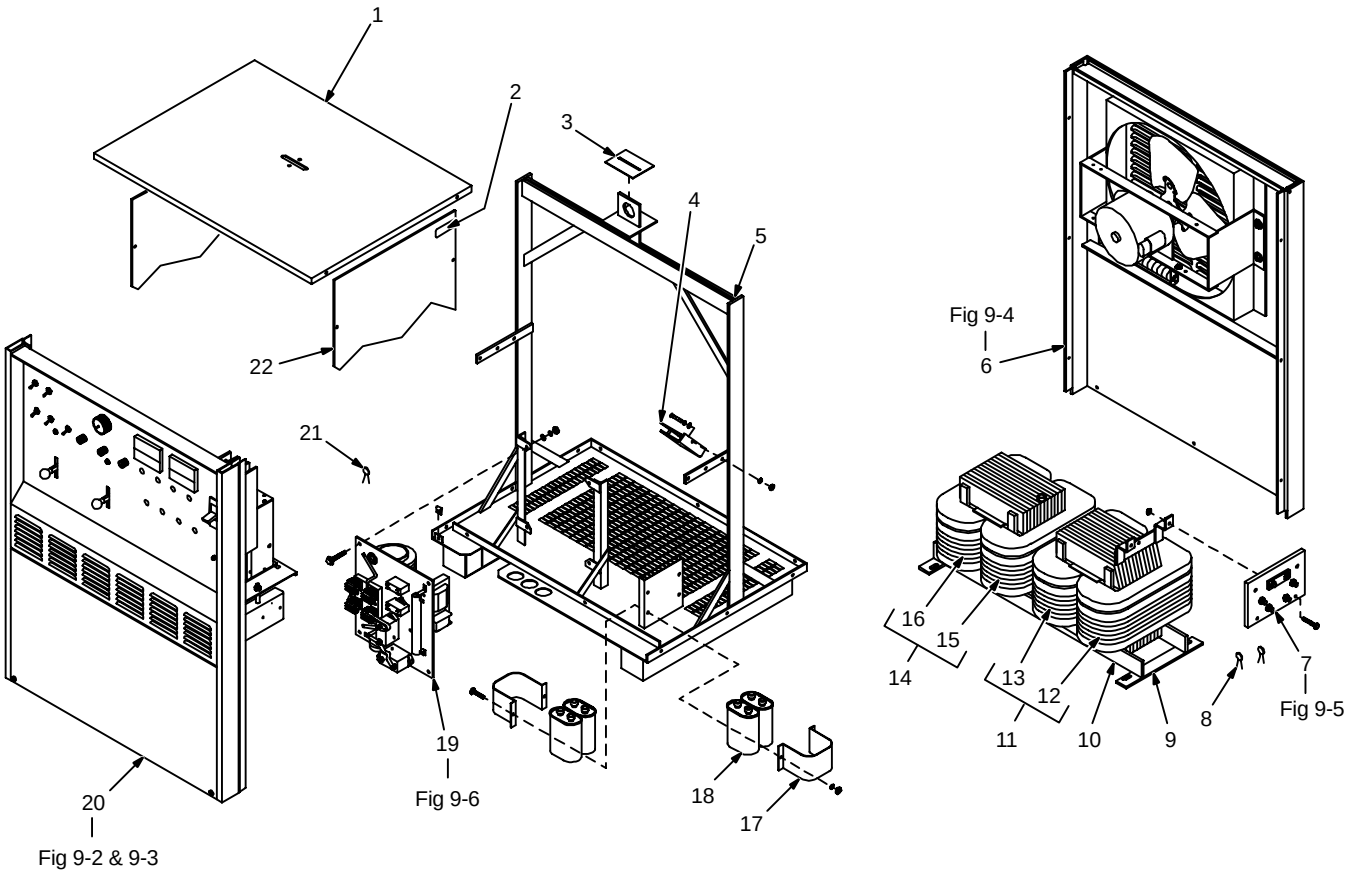


Figure 9-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 9-1. Main Assembly	
1		039 244	COVER, top	1
1		♦052 302	COVER, top w/programmer mtg	1
2		109 035	LABEL, warning electric shock can kill etc.	1
3		026 627	GASKET, lifting eye cover	1
4	HA1,HD1	059 641	SENSOR, current	1
5		135 361	BASE	1
6		Fig 9-4	PANEL, rear w/components	1
7	TE1	059 095	TERMINAL ASSEMBLY, pri triple voltage (Fig 9-5)	1
8	C1,3	112 557	CAPACITOR	2
9		135 508	BAR, mtg transformer/reactor	2
10		000 194	BAR, stl .375 x 2.000 x 29.750	2
		022 113	BAR, stl .250 x 1.000 x 5.875	2
11	T1	145 268	TRANSFORMER, pwr main 200(208)/230/460 (consisting of)	1
12		139 543	COIL, pri/sec RH	1
13		139 542	COIL, pri/sec LH	1
11	T1	145 267	TRANSFORMER, pwr main 230/460/575 (consisting of)	1
12		139 545	COIL, pri/sec RH	1
13		139 544	COIL, pri/sec LH	1
14	Z1	059 113	REACTOR, square wave (consisting of)	1
15		059 101	COIL, rear sq wave RH	1
16		059 102	COIL, rear sq wave LH	1
17		025 141	BRACKET, mtg capacitor	2
18	C2	114 610	CAPACITOR, polyp met film 30uf 480VAC	4
19		108 323	HF PANEL, (Fig 9-6)	1
20		Fig 9-2 & 9-3	PANEL, front w/components	1
21	C16	009 062	CAPACITOR	1
22		+039 248	PANEL, side	2
		140 508	KIT, label	1

♦OPTIONAL

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*

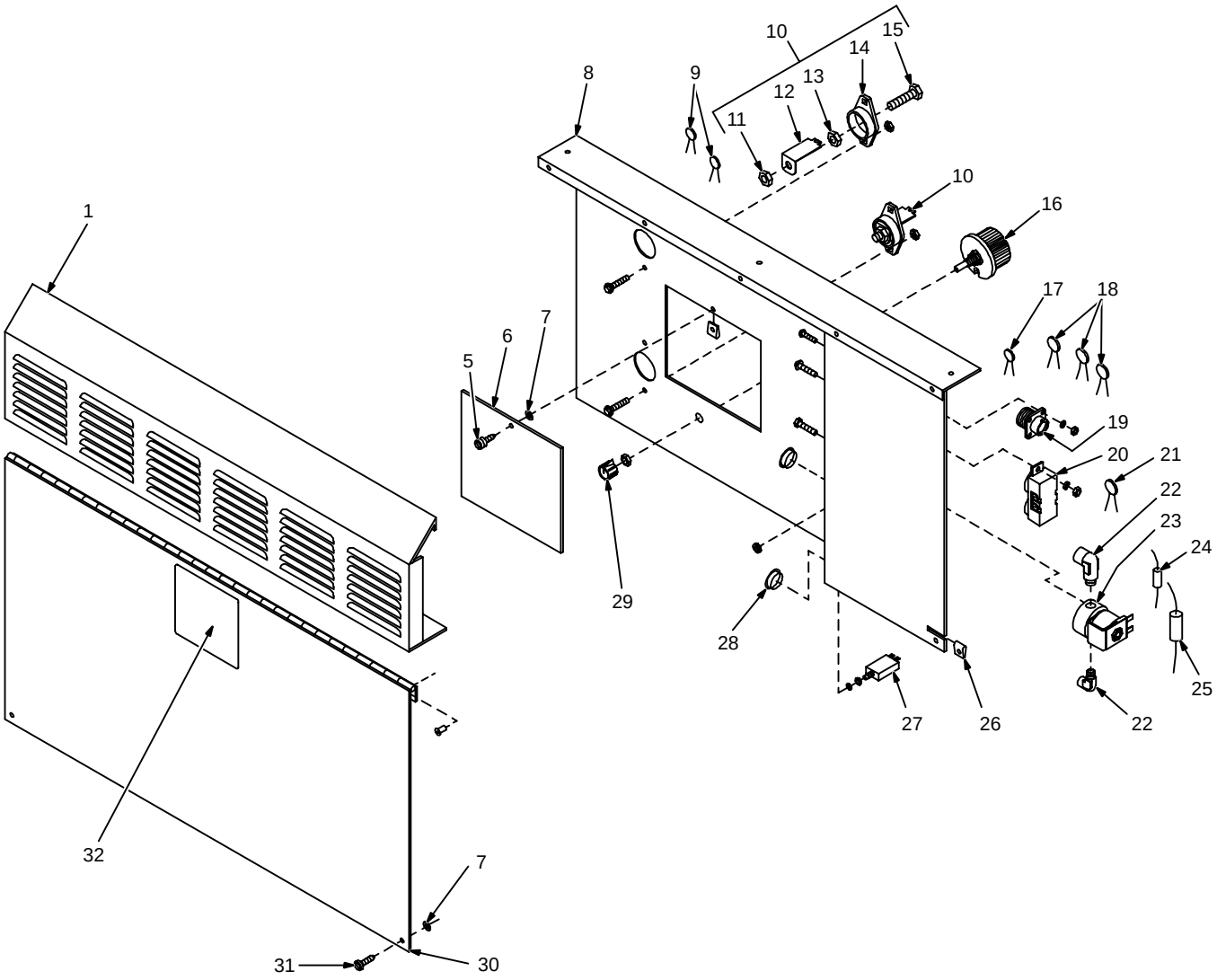


Figure 9-2. Panel, Front (Lower Section) w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 9-2. Panel, Front (Lower Section) w/Components (Fig 9-1 Item 20)	
1		003 045	PANEL, front louvered	1
5		602 358	FASTENER, scr knrl hd No. 2	1
6		052 467	DOOR, access HF	1
7		010 855	RETAINER, screw No. 2	3
8		130 171	PANEL, front	1
9	C15	136 736	CAPACITOR	1
10		039 047	TERMINAL, pwr output red (consisting of)	2
11		601 879	NUT, stl hex full fnsh .500-13	1
12		039 044	BUS BAR, term bd	1
13		601 880	NUT, stl hex jam .500-13	1
14		039 049	TERMINAL BOARD, red	1
15		601 976	SCREW, cap stl hexhd .500-13 x 1.500	1
16	R20	198 547	RHEOSTAT, WW 25W 1.5 ohm	1
17	C24	144 298	LEAD ASSEMBLY, elect	1
18	C20	144 296	LEAD ASSEMBLY, elect	1
18	C21	144 297	LEAD ASSEMBLY, elect	1
18	C25	144 295	LEAD ASSEMBLY, elect	1
19	RC2	143 976	RECEPTACLE w/TERMINALS, (consisting of)	1
		079 534	TERMINAL, female 1skt 18-14 wire	14
		134 734	HOUSING, term plug 14cont Amp 213571-2	
		134 731	TERMINAL, male 1 pin 18-14 wire Amp 213603-1	
		079 739	CLAMP, cable strain relief sz 17 Amp 206322-2	
20	RC1	604 176	RECEPTACLE, str dx grd 2P3W 15A 125V	1
		073 690	CAP, P & S 5266DF	
21	C4	135 664	CAPACITOR	1
22		010 296	FITTING, hose brs elb M 1/4NPT x .625-18RH	2
23	GS1	003 538	VALVE, 115VAC 2 way 1/4 IPS port 1/8 orf	1
24	R9	030 761	RESISTOR, C 1W 10 ohm	1
25	C6	028 294	CAPACITOR, polye met film 1uf 250VDC	1
26		605 670	NUT, speed 12-24	3
27	CB1	093 995	CIRCUIT BREAKER, man reset 1P 15A 250VAC	1
28		070 371	BLANK, snap-in nyl 1.093/1.125mtg hole	2
29		097 922	KNOB, pointer .875dia x .250 ID	1
30		+003 043	DOOR, access front	1
31		078 034	FASTENER, screw sltd hd .736 lg	2
32		203 990	LABEL, warning general precautionary	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

☞ *Hardware is common and not available unless listed.*

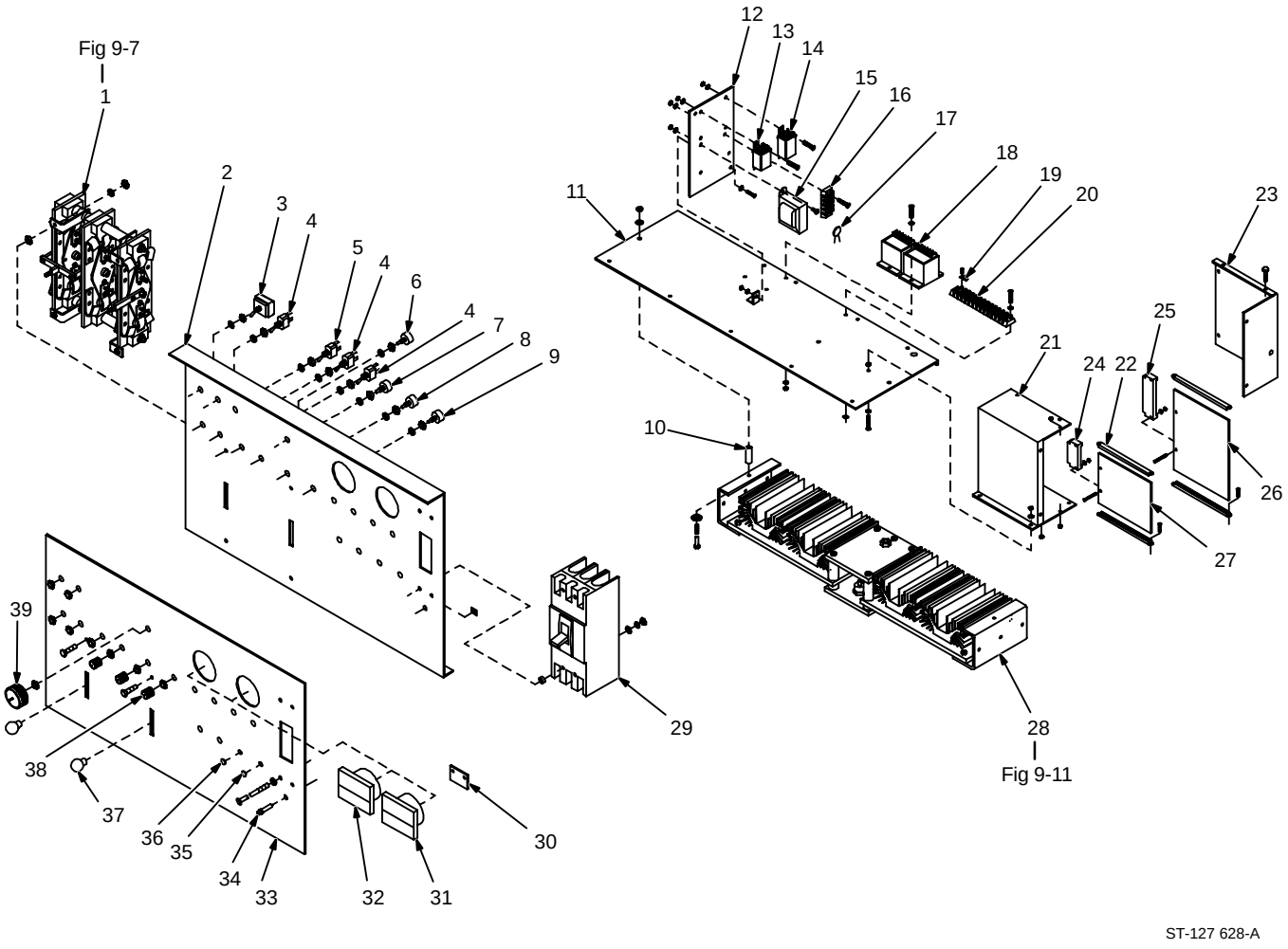


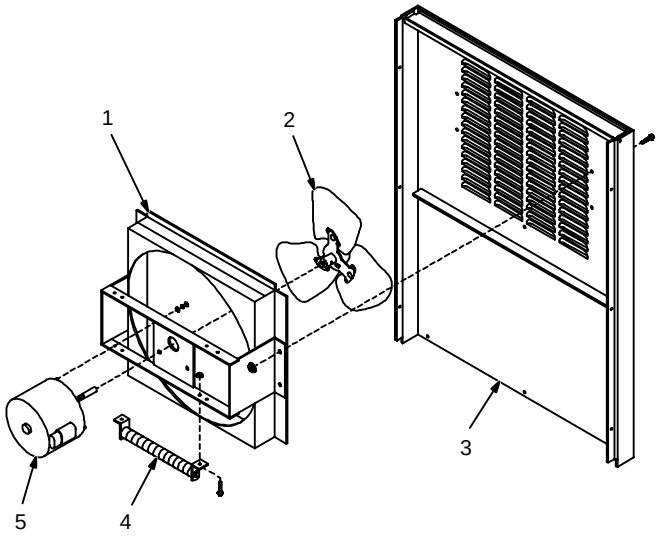
Figure 9-3. Panel, Front (Upper Section) w/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 9-3. Panel, Front (Upper Section) w/Components (Fig 9-1 Item 20)	
1	S5,7	059 081	SWITCH, polarity/selector (Fig 9-7)	1
2			PANEL, front (Fig 9-2 Item 8)	1
3	S4	011 622	SWITCH, tgl 3PDT 15A 125VAC	1
4	S10-12	011 609	SWITCH, tgl SPDT 15A 125VAC	3
5	S3	011 610	SWITCH, tgl SPDT 15A 125VAC	1
6	R1	035 897	POTENTIOMETER, CP plain 1/T 2W 1K linear	1
7	R14	035 897	POTENTIOMETER, C sltd sft 1/T 2W 1000 ohm	1
8	R13	030 109	POTENTIOMETER, C sltd sft 1/T 2W 5000 ohm	1
9	R15	028 769	POTENTIOMETER, C sltd sft 1/T 2W 750K ohm	1
10		007 097	TUBING, stl .500 OD x .060 x 1.437	2
11		106 556	BAFFLE, panel front	1
12		059 152	PANEL, mtg components	1
13	CR2	000 174	RELAY, encl 24VAC 3PDT	1
	SN1	110 079	SNUBBER, polye MF .5uf 200VDC	1
14	CR1	052 251	RELAY, volt sense 100V DPDT	1
15	T2	035 759	TRANSFORMER, control mintr 115/36VCT	1
16	2T	038 081	BLOCK, term 30A 4P	1
17	C23	139 204	CAPACITOR,	1
18	FC1,2	110 142	PULSE MODULE	2
19		601 219	LINK, jumper term blk 20A	4
20	1T	038 833	BLOCK, term 20A 13P	1
		107 794	ENCLOSURE, circuit card (consisting of)	1
21		188 531	.... ENCLOSURE, circuit card	1
22		188 534	.... GUIDE, circuit card	4
23		188 532	.... PANEL, encl circuit card	1
24	PLG20	039 347	TERMINAL, hdr 17skt	1
		003 168	TERMINAL, frict fem mintr 20-18 wire	17
25	PLG3	039 358	TERMINAL, hdr 35skt	1
		003 168	TERMINAL, frict fem mintr 20-18 wire	35
26	PC1	110 459	CIRCUIT CARD, control	1
27	PC2	052 790	CIRCUIT CARD, HF & post-flow timer	1
28	SR1	119 939	RECTIFIER, SCR main (Fig 9-11)	1
29	S1	059 518	CIRCUIT BREAKER, 2P 225A 600VAC	1
30		080 309	CIRCUIT CARD, meter calibration	1
31	A	059 494	METER, amp ac/dc 0-750 scale	1
32	V	080 311	METER, volt ac/dc 0-100 scale	1
33			NAMEPLATE, (order by model and serial number)	1
34	PL1	027 645	LIGHT, indicator 125VAC red lens	1
35		107 983	BLANK, snap-in nyl .500mtg hole	3
36		119 951	BLANK, snap-in nyl .437mtg hole	5
37		019 603	KNOB, ball 1.250 OD w/.250-20fthrd	2
38		097 922	KNOB, pointer	3
39		097 926	KNOB, pointer 2.375dia x .250 ID	1

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

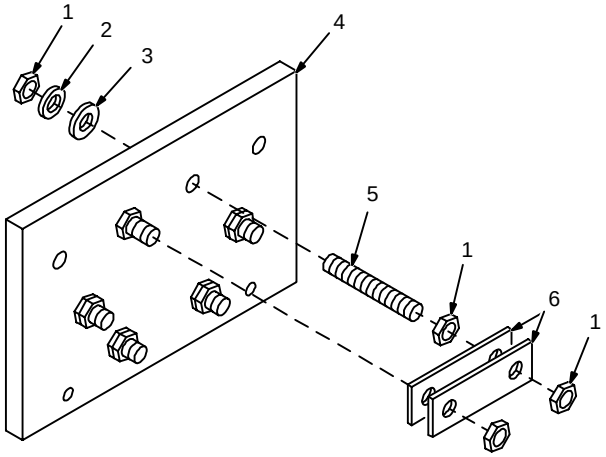
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
			Figure 9-4. Panel, Rear w/Components (Fig 9-1 Item 6)	
1		020 729	CHAMBER, plenum 18in	1
2		032 606	BLADE, fan 18 in 3wg 22deg .500 bore CW	1
3		059 068	PANEL, rear	1
4	R10	097 459	RESISTOR, WW fxd 375W 20 ohm	1
5	FM	032 605	MOTOR, cap perm SP 1/4 hp 235VAC 1625RPM	1

☞ *Hardware is common and not available unless listed.*



ST-127 630-A

Figure 9-4. Panel, Rear w/Components



ST-128 152

Figure 9-5. Terminal Assembly, Pri

Item No.	Part No.	Description	Quantity
	059 095	**Figure 9-5. Terminal Assembly, Pri (Fig 9-1 Item 7)**	
1	601 838	NUT, brs hex .375-16 jam	22
2	602 221	WASHER, lock stl intl tooth .375	8
3	010 910	WASHER, flat stl SAE .375	8
4	059 050	TERMINAL BOARD, pri	1
5	038 804	STUD, brs .375-16 x 2.500	8
6	038 898	LINK, terminal connecting	2

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
		108 323	**Figure 9-6. HF Panel (Fig 9-1 Item 19)**	
1		601 838	NUT, brs hex .375-16 jam hvy	4
2		602 243	WASHER, flat stl std .375	4
3	T4	033 373	COIL, coupling air HF	1
4	T3	074 398	TRANSFORMER, high voltage 115V pri 3600V sec 30mA	1
5		010 910	WASHER, flat stl SAE .375	2
6		603 737	SCREW, mach brs rdh .375-16 x 1.750	2
7		016 601	MOUNTING BOARD, component HF	1
8		605 742	CLIP, mtg resistor .500 ID	2
9	R11	083 784	RESISTOR, WW fxd 100W 10 ohm	1
10	C13	191 944	CAPACITOR, polyp film 10uf 250VAC	2
11	C14,17	096 761	CAPACITOR, mica .002uf 10000VDC	2
12		010 885	STRIP, conductor	4
13		111 181	LINK, connecting	1
14		199 854	SPARK GAP ASSEMBLY, (consisting of)	1
15		199 856	. . . . HOLDER, points	4
16	G	*196 455	. . . . POINT, spark gap	4
17		199 855	. . . . BASE, spark gap	1
18		601 835	NUT, brs hex 10-32	6
19		602 042	SCREW, mach brs rdh 10-32 x 1.000	1
20		038 887	STUD, pri bd brs 10-32 x 1.375	2

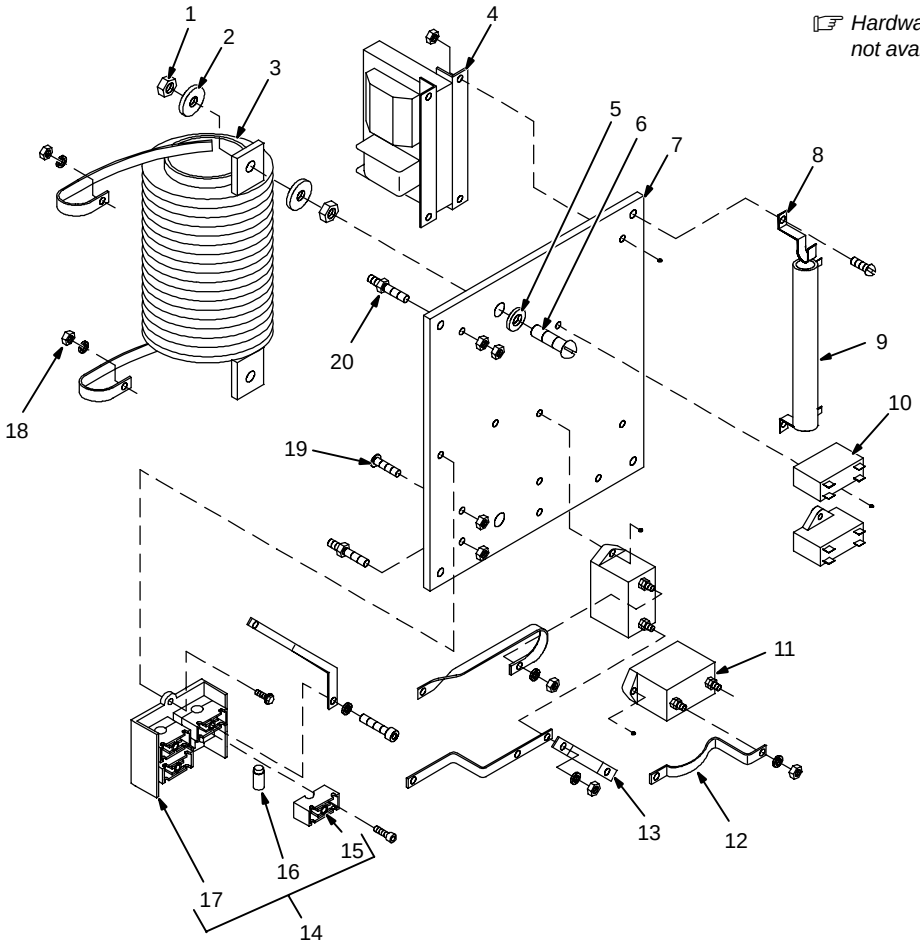


Figure 9-6. HF Panel

*Recommended Spare Parts.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
		059 081	**Figure 9-7. Switch, Range/Polarity/Selector (Fig 9-3 Item 1)**	
1		048 314	STUD, stl .250-20 x 9.500	2
2	S5	059 084	CONTACT BOARD ASSEMBLY, switch selector ac/dc (Fig 9-8)	1
3		025 181	TUBING, stl .625 OD x 12ga x .500	6
4		104 935	BRACKET, mtg switch	2
5		020 484	TUBING, stl .625 OD x 12ga x .250	2
6	S5	059 083	CONTACT BOARD ASSEMBLY, switch selector ac/dc (Fig 9-9)	1
7		003 230	TUBING, stl .625 OD x 12ga x 2.625	2
8		♦021 193	GUIDE, contact	2
9		010 086	SPACER, polarity switch	2
10	S7	059 082	CONTACTOR BOARD ASSEMBLY, switch polarity (Fig 9-10)	1
11		004 696	BRACKET, mtg switch	2
12		♦♦004 267	LINK, jumper switch (ac/dc)	1
13		♦♦080 346	LINK, jumper switch	1
14		080 348	HANDLE, switch	1

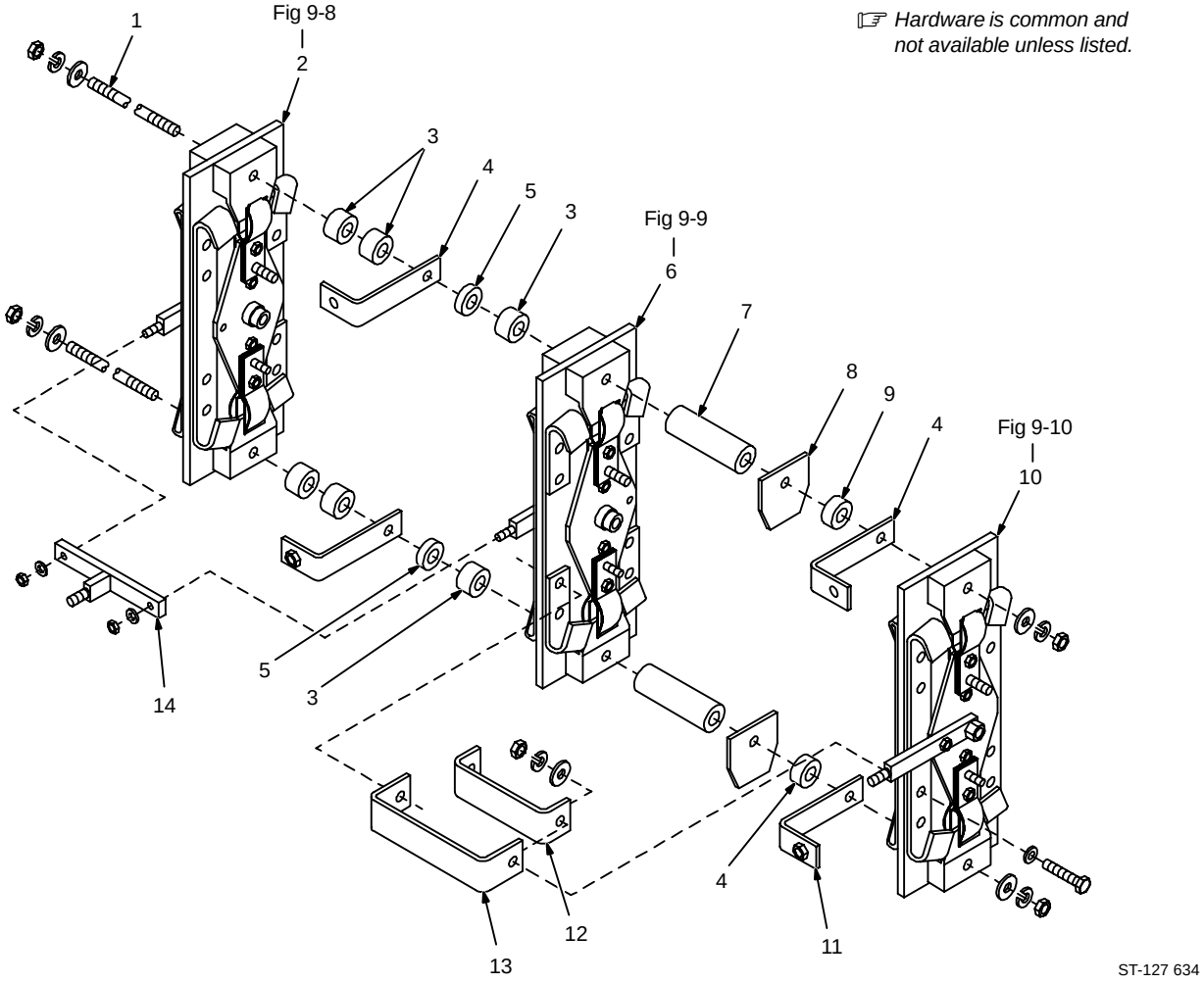


Figure 9-7. Switch, Range/Polarity/Selector

♦ Item part of 059 082 polarity switch contact board assembly.

♦♦ Items are not part of 059 081 parts list.

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Part No.	Description	Quantity
	059 084	**Figure 9-8. Contact Board Assembly, Switch Selector AC/DC (Fig 9-7 Item 2)**	
1	070 318	. . CONTACT BOARD, movable switch (consisting of)	1
2	103 632	. . . . PLATE, switch tgl	1
3	039 257	. . . . HANDLE, switch	1
4	011 080	. . . . SPACER, contact switch	2
5	011 645	. . . . CONTACT ASSEMBLY, movable switch (consisting of)	2
6	011 074	. . . . . SPRING, pressure contact switch	1
7	011 953	. . . . . CONTACT, switch	2
8	011 075	. . . . . SPRING, pressure contact switch	1
9	103 633	. . BUS BAR, shorting switch polarity	2
10	011 950	. . CONTACT, switch	2
11	011 948	. . GUIDE, contact movable switch	4
12	011 951	. . CONTACT, switch	2
13	070 317	. . CONTACT BOARD ASSEMBLY, movable switch (consisting of)	1
14	011 645	. . . . CONTACT ASSEMBLY, movable switch (consisting of)	1
15	011 075	. . . . . SPRING, pressure contact switch	1
16	011 953	. . . . . CONTACT, switch	2
17	011 074	. . . . . SPRING, pressure contact switch	1
18	011 080	. . . . SPACER, contact switch	2
19	103 632	. . . . PLATE, switch tgl	1
20	020 484	. . TUBING, stl .625 OD x 12ga x .250	1
21	024 694	. . BEARING, polarity switch	2
22	103 634	. . MOUNTING BOARD, component polarity switch	1

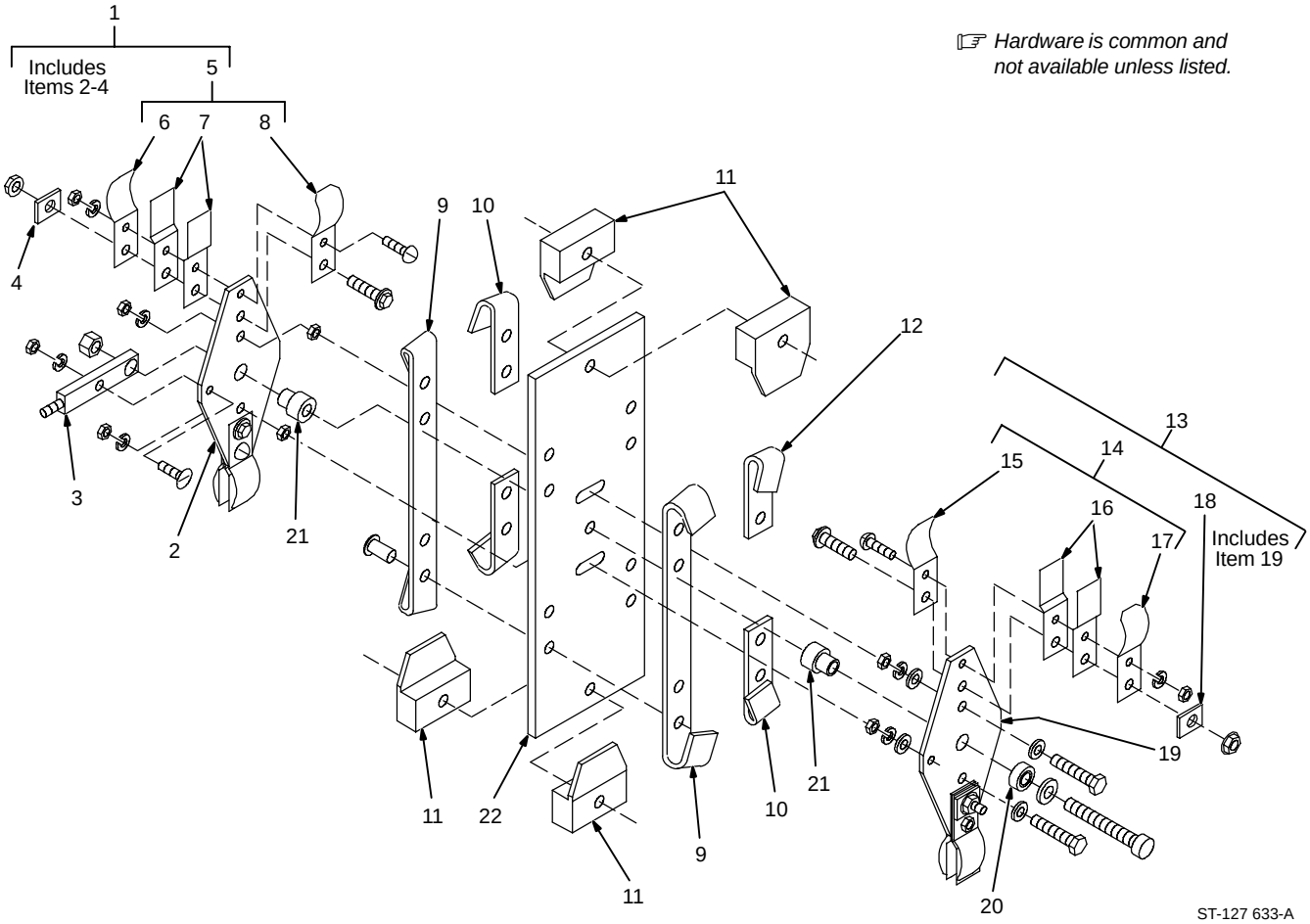


Figure 9-8. Contact Board Assembly, Switch Selector AC/DC

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Part No.	Description	Quantity
	059 083	**Figure 9-9. Contact Board Assembly, Switch Selector AC/DC (Fig 9-7 Item 6)**	
1	070 318	. . CONTACT BOARD, movable switch (consisting of)	1
2	103 632	. . . . PLATE, switch tgl	1
3	039 257	. . . . HANDLE, switch	1
4	011 080	. . . . SPACER, contact switch	2
5	011 645	. . . . CONTACT ASSEMBLY, movable switch (consisting of)	2
6	011 075	. . . . . SPRING, pressure contact switch	1
7	011 074	. . . . . SPRING, pressure contact switch	1
8	011 953	. . . . . CONTACT, switch	2
9	011 951	. . CONTACT, switch	4
10	011 950	. . CONTACT, switch	4
11	011 948	. . GUIDE, contact movable switch	4
12	070 317	. . CONTACT BOARD ASSEMBLY, movable switch (consisting of)	1
13	011 645	. . . . CONTACT ASSEMBLY, movable switch (consisting of)	2
14	011 075	. . . . . SPRING, pressure contact switch	1
15	011 953	. . . . . CONTACT, switch	2
16	011 074	. . . . . SPRING, pressure contact switch	1
17	011 080	. . . . SPACER, contact switch	2
18	103 632	. . . . PLATE, switch tgl	1
19	020 484	. . TUBING, stl .625 OD x 12ga x .250	1
20	024 694	. . BEARING, polarity switch	2
21	103 634	. . MOUNTING BOARD, component polarity switch	1

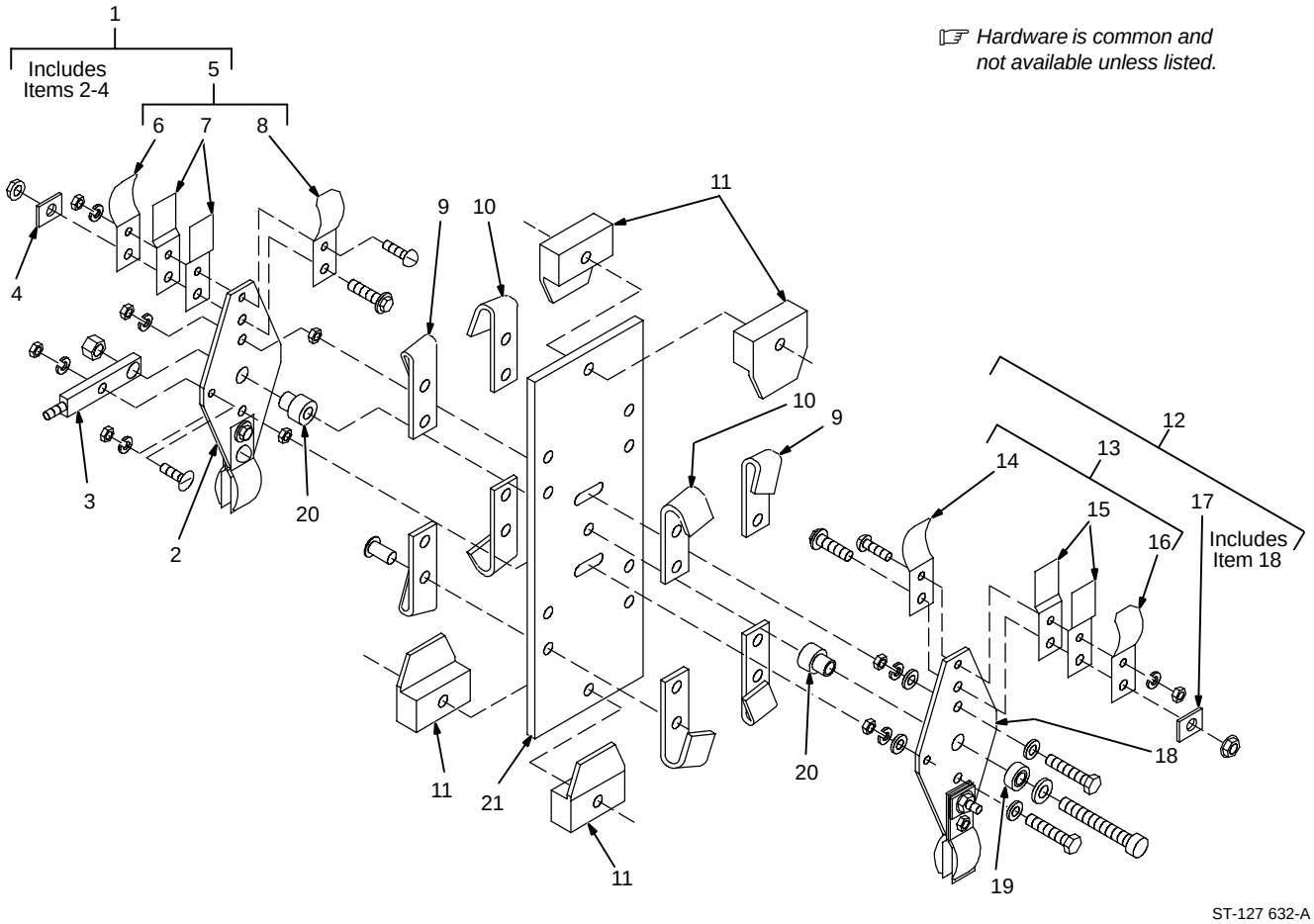


Figure 9-9. Contact Board Assembly, Switch Selector AC/DC

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Part No.	Description	Quantity
	059 082	**Figure 9-10. Contact Board Assembly, Switch Polarity (Fig 9-7 Item 10)**	
1	070 317	CONTACT BOARD ASSEMBLY, movable switch (consisting of)	1
2	103 632	PLATE, switch tgl	1
3	011 080	SPACER, contact switch	2
4	011 645	CONTACT ASSEMBLY, movable switch (consisting of)	2
5	011 075	SPRING, pressure contact switch	1
6	011 074	SPRING, pressure contact switch	1
7	011 953	CONTACT, switch	2
8	103 633	BUS BAR, shorting switch polarity	4
9	103 634	MOUNTING BOARD, component polarity switch	1
10	011 948	GUIDE, contact movable switch	2
11	070 316	CONTACT BOARD ASSEMBLY, movable switch (consisting of)	1
12	011 645	CONTACT ASSEMBLY, movable switch (consisting of)	2
13	011 075	SPRING, pressure contact switch	1
14	011 953	CONTACT, switch	2
15	011 074	SPRING, pressure contact switch	1
16	011 080	SPACER, contact switch	2
17	103 632	PLATE, switch tgl	1
18	010 805	HANDLE, switch	1
19	024 694	BEARING, polarity switch	2
20	020 484	TUBING, stl .625 OD x 12ga x .250	1

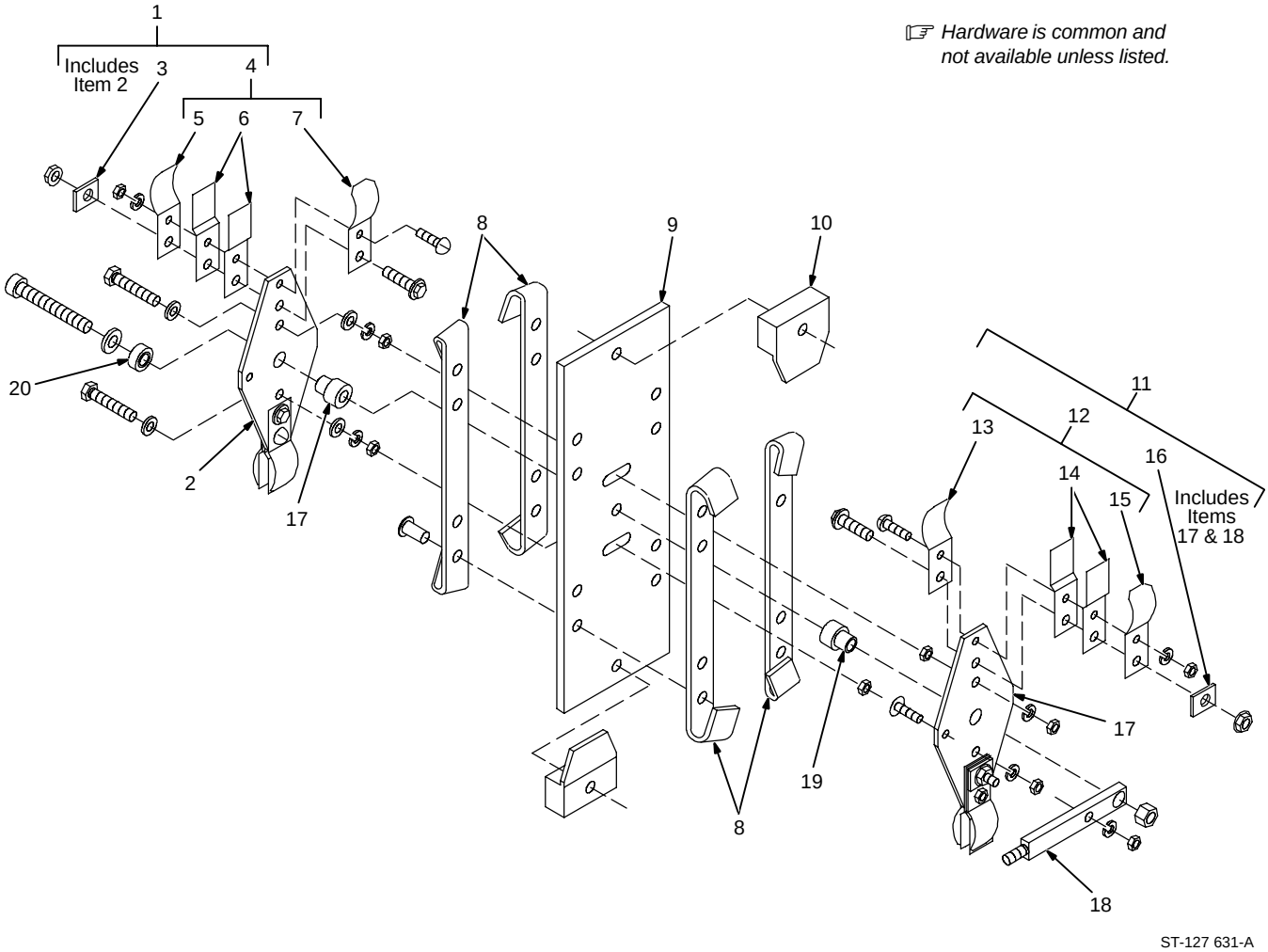
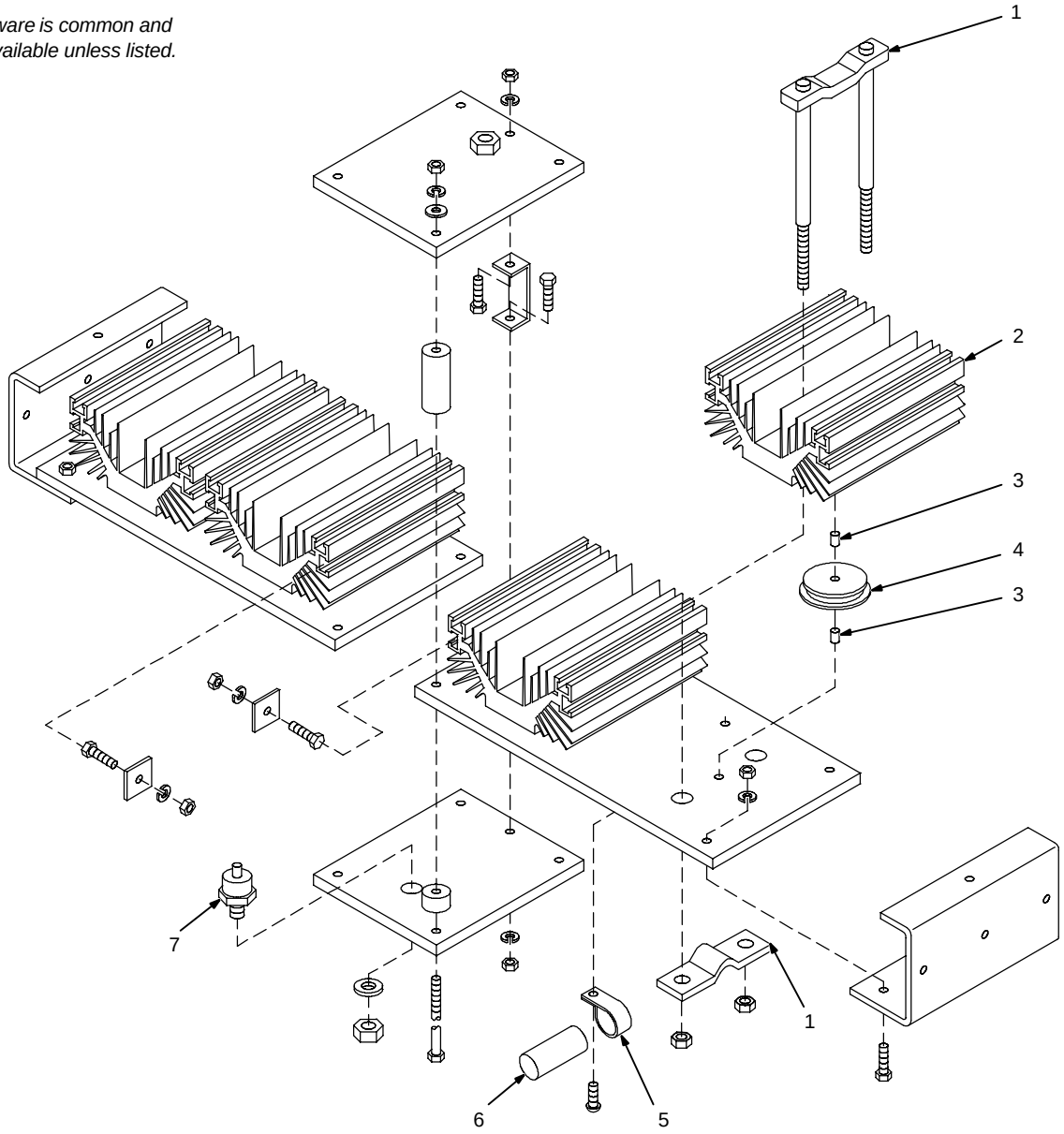


Figure 9-10. Contact Board Assembly, Switch Polarity

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
	SR1	**119 939**	**Figure 9-11. Rectifier, SCR Main (Fig 9-3 Item 28)**	
1		166 667	CLAMP, spring	4
2		059 075	HEAT SINK, rectifier snowflake 5.500	4
3		028 516	PIN, spring CS .125 x .250	8
4	SCR1-4	112 941	THYRISTOR, SCR 700A 300V	4
5		010 311	CLAMP, nyl .750 clamp dia x .500 wide	4
6	C7-10,R3-6	044 463	SUPPRESSOR, .5uf 200V	4
7	D1	023 178	DIODE, rect 275A 300V RP	2

☞ *Hardware is common and not available unless listed.*



ST-127 636-A

Figure 9-11. Rectifier, SCR Main

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

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TRUE BLUE® WARRANTY

Effective January 1, 2001
(Equipment with a serial number preface of "LB" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the date that the equipment was delivered to the original retail purchaser, or one year after the equipment is sent to a North American distributor or eighteen months after the equipment is sent to an International distributor.

1. 5 Years Parts – 3 Years Labor
   * Original main power rectifiers
   * Inverters (input and output rectifiers only)
2. 3 Years — Parts and Labor
   * Transformer/Rectifier Power Sources
   * Plasma Arc Cutting Power Sources
   * Semi-Automatic and Automatic Wire Feeders
   * Inverter Power Supplies
   * Intellitig
   * Engine Driven Welding Generators **(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor
   * DS-2 Wire Feeder
   * Motor Driven Guns (w/exception of Spoolmate Spoolguns)
   * Process Controllers
   * Positioners and Controllers
   * Automatic Motion Devices
   * RFCS Foot Controls
   * Induction Heating Power Sources
   * Water Coolant Systems
   * HF Units
   * Grids
   * Maxstar 140
   * Spot Welders
   * Load Banks
   * Miller Cyclomatic Equipment
   * Running Gear/Trailers
   * Plasma Cutting Torches (except APT & SAF Models)
   * Field Options
     (NOTE: Field options are covered under True Blue® for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
4. 6 Months — Batteries
5. 90 Days — Parts
   * MIG Guns/TIG Torches
   * Induction Heating Coils and Blankets
   * APT, ZIPCUT & PLAZCUT Model Plasma Cutting Torches
   * Remote Controls
   * Accessory Kits
   * Replacement Parts (No labor)
   * Spoolmate Spoolguns
   * Canvas Covers

Miller's True Blue® Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear.**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

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Owner's Record

Please complete and retain with your personal records.

Model Name Serial/Style Number

Purchase Date (Date which equipment was delivered to original customer.)

Distributor

Address

City

State Zip

For Service

Call 1-800-4-A-Miller or see our website at www.MillerWelds.com to locate a DISTRIBUTOR or SERVICE AGENCY near you.

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